ECONOMIC STUDY OF VEAL CALVES

BY

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B.S., University of Illinois, 1935

M.S., University of Illinois, 1937

TWO BULLETINS CONTAINING THE ESSENTIAL MATERIAL IN A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN AGRICULTURAL ECONOMICS IN THE GRADUATE SCHOOL OF THE UNIVERSITY OF ILLINOIS,

1945

Copies of KENTUCKY AGRICULTURAL EXPERIMENT STATION Bulletins

No. 483, April 1946, and No. 490, June 1946

Bulletin 483 April, 1946

An Analysis of Prices of Veal Calves

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An Analysis of Prices of Veal Calves

By A. J. Brown[1]

As an agricultural commodity, veal calves are a byproduct of dairying, the calf being necessary to milk production but of far less monetary value than the total amount of milk produced in a lactation period. Production of veal, though thus tied up with dairying, is not so inflexibly dependent upon the number of milk cows as might at first be supposed, for farmers have a choice among several ways of disposing of their calves, of which veal production is only one. They may kill calves shortly after birth, save them or sell them for herd replacements, sell them as vealers, or keep them longer, for sale as older calves. Even though farmers may sell calves as vealers, they have the choice of selling them at light or at heavier weights. Production of veal calves may thus be regarded as an alternative method of marketing milk, competing with the sale of whole milk and of butterfat. The relation between price of milk (including price of butterfat) and price of veal calves becomes an important consideration in farmers' choices whether to use veal calves as a market outlet for milk.

While not a major source of income on individual farms, veal calves make, in total, an important contribution to farm income. In 1939, veal calves were sold from about one-fourth of all the farms in the United States, more farms selling calves than either cattle or sheep.[2] Because of the nature of the milk-production enterprise, veal calves are usually marketed from a given farm in small numbers, often 1 to 4 calves at a time. In Kentucky, both the number and the average weight of veal calves marketed have increased during the past 20 years.

Many economic studies have dealt with the marketing and pricing of milk, but few have dealt with any phase of the marketing and pricing of veal calves. Though milk is the major product of dairying, yet income from veal calves bears upon the profitability of the whole dairy enterprise. In times of surplus milk production, moreover, the raising of veals to heavier weights is a means of diverting milk into meat. The economics of veal calf production therefore deserves more recognition than it has had in economic studies of dairying.

[1] The author wishes to acknowledge the helpful suggestions of Dana G. Card in developing this subject.

[2] In 1939, about 1,802,000 farms out of a total of 6,097,000 farms in the United States reported sales of calves under 1 year old, according to the 1940 Census of Agriculture. This proportion of slightly less than 30 percent would be reduced to an estimated 20 percent when considering only veal calves. About 1,700,000 farms sold cattle, and about 386,000 farms sold sheep.

VEAL CALVES AS A COMMODITY FOR MARKET AND CONSUMPTION

Classification and Marketing of Calves

Calves at the markets are generally grouped as "stocker and feeder calves" (those bought by farmers for further grazing and feeding), and calves for immediate slaughter. Those for immediate slaughter are, on many of the markets, further classified as veal calves (or vealers) and slaughter calves. Veal calves or vealers usually are not more than 3 months old, have been fed almost entirely on milk, and are therefore frequently referred to as milk-fed calves. Slaughter calves, though they retain many calf characteristics, are usually older and heavier, and have had feed other than milk, in varying amounts and for a considerable period. Their appearance is different from that of the vealers, and the difference is reflected in the carcasses they produce.[1] Weight groups of these two classifications are in general as follows:[2]

Veal Calves		*Slaughter Calves* (Heifers, steers, and bulls)	
Lightweight	Under 110 lb	Lightweight	Under 200 lb
Mediumweight	110-180 lb	Mediumweight	200-300 lb
Heavyweight	Over 180 lb	Heavyweight	Over 300 lb

Veal calves seldom exceed 240 pounds, and most slaughter calves are heavier than 240 pounds. On some markets the dividing line between calves and cattle is 400 pounds; on others, 500 pounds.

More veal calves are marketed than either slaughter calves or stocker and feeder calves. Specific data are not available on marketing of the three classifications, but estimates can be based upon the disposition series for cattle and calves and the breakdown of numbers on farms January 1, as published by the U. S. Department of Agriculture. Of the average annual slaughter of 9½ million calves during 1937-42, probably about two-thirds to three-fourths were veal calves,[3] and one-fourth to one-third were slaughter calves. Roughly, between 1 million and 1½ million stocker and feeder calves were marketed annually during the same period.

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[1] L. B. Burk and C. V. Whalin, *Market Classes and Grades of Livestock*, U. S. Dept. Agr. Bul. 1360, 1942 (revised), p. 14.

[2] Combined from schedules of market classification for veal and slaughter calves as given by Burk and Whalin, p. 16.

[3] A similar estimate is that "Although no official figures are available on the number of dairy calves slaughtered, it has been estimated that approximately 80 percent of all those going into slaughter channels are of dairy or indiscriminate breeding."—F. W. ImMasche, "Consumption and Production of Veal in the United States," *Armour's Livestock Bureau Monthly Letter to Animal Husbandmen*, 2 (12), 1931.

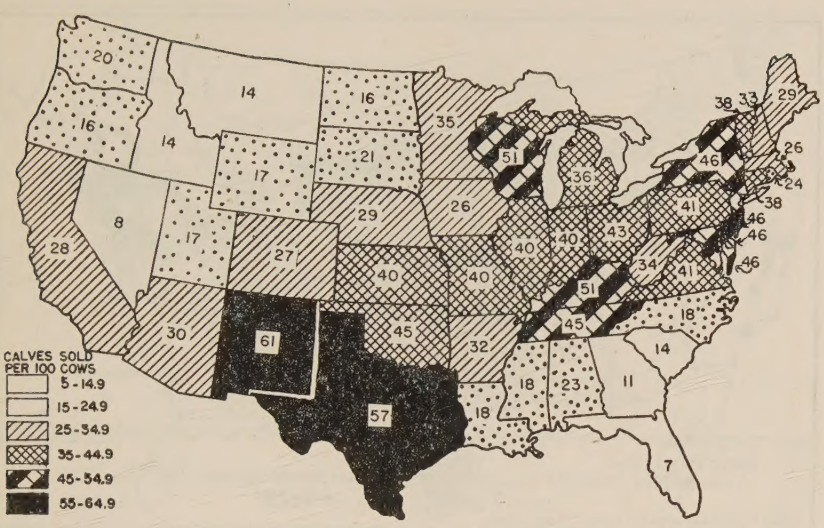

FIG. 1.— NUMBER OF CALVES SOLD PER 100 COWS (MILK AND BEEF), BY STATES, 1939

Basic data are from the 1940 Census of Agriculture. Number of cows includes the number of cows milked in 1939 plus the number of beef cows on farms April 1, 1940. Number of calves sold is for the calendar year, 1939.

Where Calves are Produced and Marketed

Production areas

Not all calves raised on farms are sold as calves. Substantial numbers are kept on farms where produced, either for replacement for the beef or dairy herd or for use in the beef cattle production enterprise. The number of calves sold per 100 cows on farms varied widely among the states in 1939 (Fig. 1). Largest sales of calves per 100 cows were in New Mexico, Texas, Wisconsin, Kentucky, New York, New Jersey, Delaware, Maryland, Tennessee, and Oklahoma. In the western, northwestern, and southeastern areas of the United States a much smaller proportion of the calves was sold from farms. Number of calves sold per state is shown in Fig. 2. Texas sold most (about 1,787,000); Wisconsin and New York were second and third, with about 1,056,000 and 593,000 calves, respectively.[1]

These numbers shown in Fig. 2 include veal, slaughter, and stocker and feeder calves. Because data on the primary areas from which veal calves are marketed are unavailable, the location of the important marketing areas for veal calves must be indirectly approximated. This approximation can be made by comparing with Fig. 2 the distribution of milk cows on farms in 1939 (Fig. 3), inasmuch as the production of

[1] Figures are from *A Graphic Summary of Farm Animals and Animal Products*, U. S. Dept. Agr. Misc. Pub. 530, 1943, p. 22.

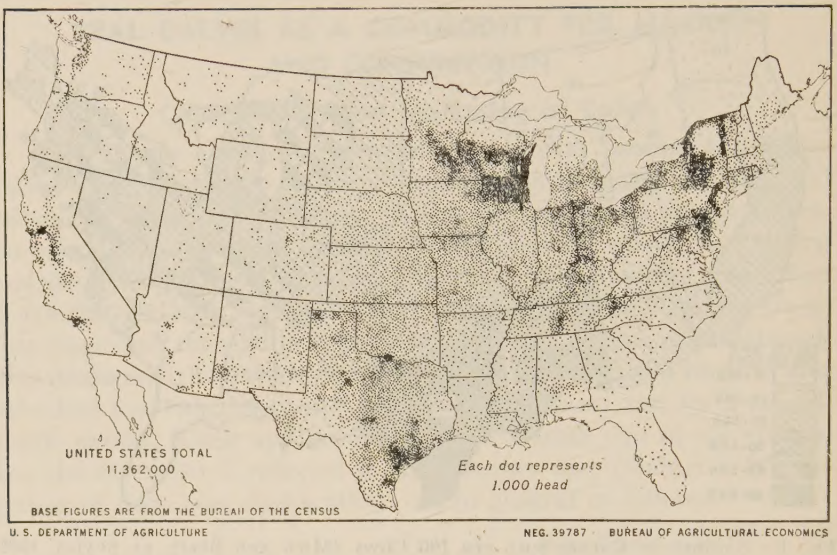
UNITED STATES TOTAL
11,362,000
Each dot represents
1,000 head
BASE FIGURES ARE FROM THE BUREAU OF THE CENSUS
U. S. DEPARTMENT OF AGRICULTURE
NEG. 39787 BUREAU OF AGRICULTURAL ECONOMICS

FIG. 2.— NUMBER OF CALVES UNDER ONE YEAR OF AGE SOLD BY FARMERS, UNITED STATES, 1939

veal calves is closely associated with the dairy enterprise.[1] Largest numbers of milk cows on farms were in the important milk-producing states of Wisconsin, Minnesota, Iowa, and New York, though they were distributed in important proportions throughout the Mississippi Valley and in the states to the east. Nearly 90 percent of the dairy cattle in the United States in 1939 were in the eastern half of the country. Wisconsin that year had 2,024,000 head; Minnesota 1,552,000; Iowa 1,293,000; New York 1,270,000, and Texas 1,147,000 head. No other state had as many as a million head. Kentucky had 515,000 cows and heifers milked.[2]

Wide variations in average weight of calves marketed in the different states (Fig. 4) give further indication of important areas of production of veal calves. In each of the New England states the average weight of calves marketed was less than 110 pounds in 1937, the latest year for which such published data are available. These calves can be classified as lightweight veal calves. Average weights of calves marketed from the remaining states east of the Mississippi and also in the

[1] Though the proportion of calves from milk cows disposed of for veal differs in different areas, an estimate for New York gives some indication of the disposal in an important dairy area. Of the 1¼ million calves born each year during 1927-36 on New York dairy farms, it has been estimated that 56 percent were available for veal, 30 percent were raised for dairy cows and bulls, 10 percent were killed at birth for the hides, and 4 percent died.—N. Y. State Dept. Agr. and Markets Agr. Bul. 313, Nov. 1937.

[2] U. S. Dept. Agr. Misc. Pub. 530, p. 33.

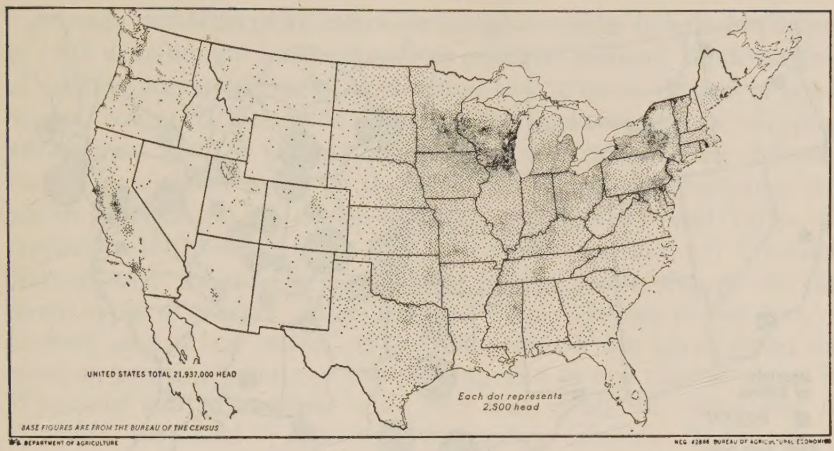

FIG. 3.— NUMBER OF COWS AND HEIFERS MILKED DURING ALL OR ANY PART OF 1939, UNITED STATES

important dairying states of Minnesota and Iowa were also within the mediumweight veal range, though in Wisconsin, and to a lesser extent in Minnesota and Iowa, the calves were on the light side of the mediumweight classification. Many of the calves in these states probably were sold as lightweight veal calves. The high proportion of

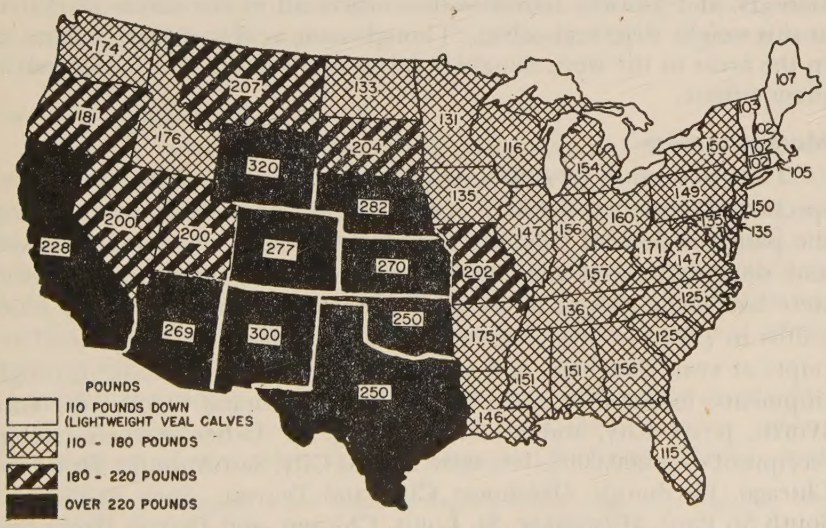

FIG. 4.— AVERAGE WEIGHT OF CALVES MARKETED, BY STATES, 1937

Data from *Farm Production from Meat Animals,* 1936-37, U. S. Dept. Agr., Bur. Agr. Econ. This information for a more recent year has not been published in this series.

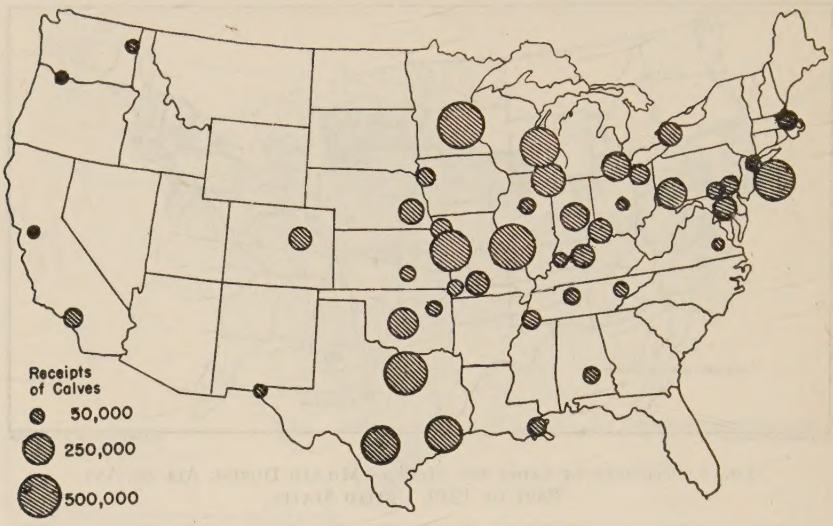

FIG. 5.— RECEIPTS OF CALVES AT TERMINAL MARKETS HAVING RECEIPTS OF OVER 25,000 HEAD, UNITED STATES, 1942

Data from *Livestock, Meats and Wool Market Statistics and Related Data*, U. S. Dept. Agr., 1942, p. 15.

milk cows to beef cows in these states other than Mississippi, Alabama, Georgia, and Florida, indicates that nearly all of the calves marketed at this weight were veal calves. Though some veal calves are marketed in the areas to the west, slaughter calves and stocker and feeder calves predominate.

Market centers

The proportion of calves obtained by packers, under federal inspection, at terminal markets[1] has been on a downward trend during the past two decades. Slightly over three-fifths of the combined veal and slaughter calves slaughtered under federal inspection in 1944 were bought by packers at terminal markets, compared to nearly nine-tenths in 1923. In 1944, South St. Paul had the largest combined receipts of veal, slaughter, and stocker-feeder calves, including through shipments, followed in order by St. Louis National Stockyards, Fort Worth, Jersey City, and Milwaukee (Fig. 5). Other markets having receipts of over 200,000 calves were Kansas City, San Antonio, Houston, Chicago, Pittsburgh, Oklahoma City, and Detroit. Such markets as South St. Paul, Milwaukee, St. Louis, Chicago, and Detroit likely had the largest salable receipts of veal calves.

[1] Other terms used for this type of market are "public stockyards," "public terminal market," and "public market."

Nearly two-fifths of all calves for slaughter under federal inspection in 1944 were bought from other than terminal markets. Such markets as packing plants (direct sales), auctions or sale barns, dealers or truck buyers, concentration yards, local markets and cooperative shipping associations handled varying quantities of veal calves in the different states. In a recent study by the Corn Belt Livestock Marketing Research Committee[1] of choice of market outlets for veal calves by farmers in 14 Corn-Belt states in 1940 it was shown that: (1) Terminal markets were the most generally used market outlet, though the different types of market outlets received widely varying proportions of farmers' sales of veal calves. (2) Use of auctions or sale barns varied the greatest, practically no veal calves being sold at this type of outlet in Wisconsin and Minnesota, while over half of all the calves sold in Kentucky were sold by farmers at the auction markets. (3) Dealers or truck buyers[2] received 10 to 37 percent (Wisconsin) of all the veal calves in all states except Indiana, Nebraska, and Kentucky. (4) Packing plants as markets for calves were most used by farmers in Iowa and Minnesota, with about one-third of all calves being sold there. In 8 of the 14 states less than 10 percent of the veal calves went to this type of market outlet. (5) Concentration yards or local markets received 10 to 20 percent of all the calves in Indiana, Ohio, Illinois, Michigan, Missouri, and Kentucky (mostly local markets). These markets received a smaller proportion of the farmers' sales in the other states. (6) Local cooperative associations were most used by farmers as market outlets for veal calves in Wisconsin, North Dakota, and Minnesota.

Slaughter centers

Slaughter of veal calves is not so centralized as the slaughter of cattle, hogs, sheep, and slaughter calves. More than half of the veal produced is slaughtered by wholesale slaughterers, not dealing in interstate trade, or by local butchers and farmers.[3] Most meat-packing concerns slaughter all four of the kinds of livestock and distribute them to the wholesale and retail trade through the same marketing organization. From standpoint of quantity, however, veal is a minor product with most meat packers.

In and near South St. Paul, Milwaukee, and Jersey City the slaughter of veal calves is greatest. Other cities, and their vicinities, where the slaughter of veal calves is quite large are St. Louis, Chicago, and

[1] *Marketing Livestock in the Cornbelt Region,* S. Dak. Agr. Exp. Sta. Bul. 365, 1942, p. 125.

[2] Truck buyers also purchase many veal calves in New York and possibly in other eastern states.

[3] W. C. Davis and C. M. Harris, *Market Classes and Grades of Dressed Veal and Calf Carcasses,* U. S. Dept. Agr. Cir. 103, 1937, p. 5.

Detroit. Fort Worth is the leading city in the number of slaughter calves slaughtered.

Consumption of Veal[1]

Veal comprises a relatively small proportion of the total meat consumed in the United States. Although the proportion varies slightly from year to year, it has generally been between 4 and 6 percent of the total meat consumption.

While some veal is consumed in the small towns and by the rural population, it is in the larger cities, particularly those with a large foreign-born population (especially French, German, Scandinavian, and Italian) or a large Jewish population, that the consumption of veal is greatest.[2]

The following estimate of per-capita consumption of veal by the urban and rural population in different areas in the United States for 1920 was made by the U. S. Department of Agriculture:[3]

	Urban (pounds)	*Rural (pounds)*
North Atlantic	13.5	10.7
North Central, East	11.6	7.2
North Central, West	11.7	6.3
South Atlantic	5.7	3.2
South Central	4.4	1.7
Western	16.3	9.3
Total	11.8	5.4

TRENDS IN PRODUCTION AND PRICE OF VEAL[4]

Veal production more than doubled from 1899, the first year for which data are available, to 1944 (Fig. 6). This long-time increase in production can be characterized as a cyclical upward trend increasing at the rate of about 15 million pounds annually. Production varied from less than 400 million pounds in 1899 to nearly 1,600 million pounds in 1944.

Relation to all meats

Veal production, over this 45-year period, increased at a greater rate than the production of all meats in the United States (Fig. 7). The proportion of veal in the total meat production varied from less than 4 percent prior to 1902 to over 6.5 percent by the mid-1930's. In relation to production of all meats, veal production increased at the rate of .07 percent annually from 1899 to 1940. In relation to con-

[1] Despite a technical difference between "veal" and calf," the term "veal" as used in this section includes the two meats. Data available cannot be accurately separated as to veal and calf.

[2] ImMasche, "Consumption and Production of Veal in the United States," pp. 1-3.

[3] U. S. Dept. Agr., 1920 Yearbook, p. 828.

[4] Includes the meat from both veal and slaughter calves.

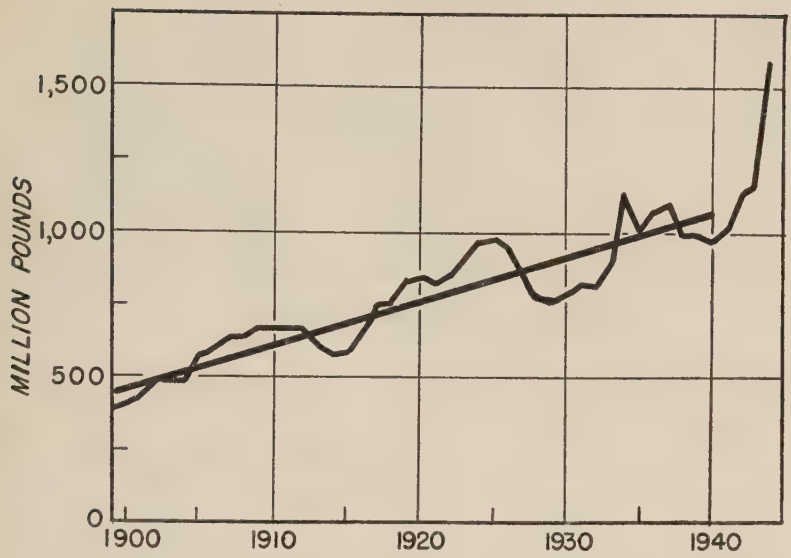

FIG. 6.— PRODUCTION OF VEAL IN THE UNITED STATES BY YEARS, 1899-1944

sumption of all meats, consumption of veal also increased, but at a slightly lower rate (Fig. 7). The difference in rates was caused by reduction in exports of meats other than veal, as practically all veal produced in the United States was domestically consumed.

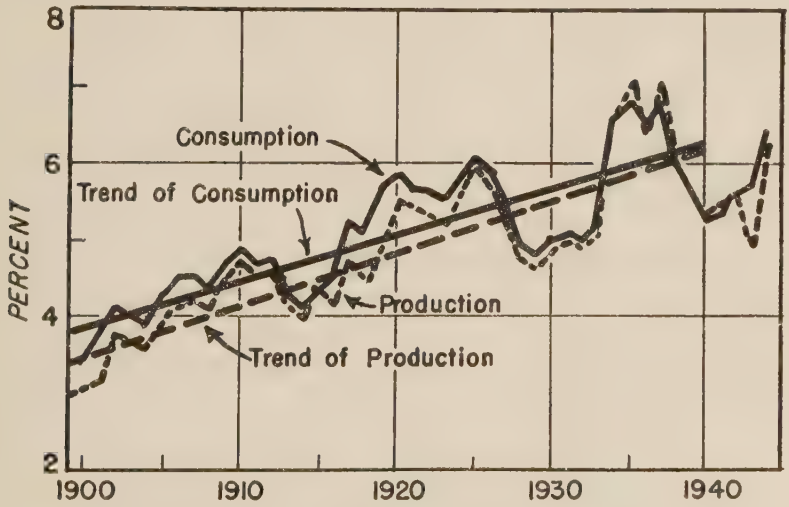

FIG. 7.— PRODUCTION AND CONSUMPTION OF VEAL AS PROPORTIONS OF TOTAL MEAT PRODUCTION AND CONSUMPTION, UNITED STATES, 1899-1944

Data for both charts from *Livestock, Meats, and Wool Market Statistics and Related Data*, U. S. Dept. Agr., 1943, p. 97; and from *Livestock and Wool Situation*, U. S. Dept. Agr., April 1945, p. 6.

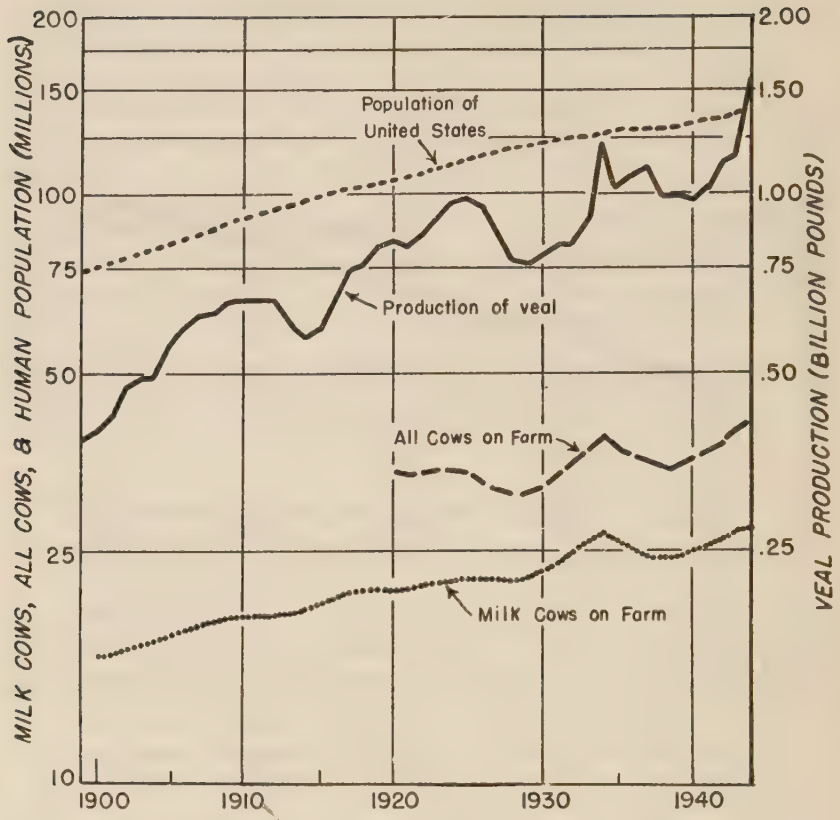

FIG. 8.— TREND OF PRODUCTION OF VEAL AS RELATED TO POPULATION, NUMBERS OF MILK COWS, AND ALL COWS ON FARMS, UNITED STATES, 1899-1944

Data from *Population Estimates, 1900-1943* (Mimeo., Dec. 1943), from *Livestock, Meats and Wool Market Statistics and Related Data,* 1943, pp. 7 and 97, and from *Livestock and Wool Situation,* April 1945, p. 6.

Causes of upward trend of veal production

The primary cause of the upward trend in veal production was that veal is a byproduct of the persistently growing dairy industry, which in turn has followed a somewhat similar trend of human population (Fig. 8). Milk cow numbers on farms, as of January 1, increased from 16.1 million in 1899 to about 27.8 million in 1945, an increase of 73 percent. The human population increased from 73 million to about 139 million during the same period, an increase of 90 percent.

The rising trend in veal production was at a somewhat higher rate than the increase in cow numbers (Fig. 8), for which difference there are several possible causes. First, fewer dairy calves have been kept for beef production in recent years; more have been marketed as veals.

Second, higher efficiency in dairying has resulted in more calves being produced, and also has lowered the rate of annual replacement in dairy herds. Per 100 cows 2 years old and over, an annual average of 76 calves were born during 1924-28,[1] and 84 in 1940-41. Third, better prices for veal calves in recent years in relation to prices of butterfat and whole milk (see pages 44 to 46) have given greater incentive to produce veal calves and, in some areas, to market them at heavier weights. While there was little change in the average production of veal per calf prior to 1933, from 97 pounds in 1907-11 to 103 pounds in 1929-33, average production of veal per calf ranged between 106 and 108 pounds during 1934-40 and increased to 117 pounds during 1942-44.

Other more indirect factors probably have influenced the sharper increase in veal production than in milk cow numbers. One such factor is that markets have become more accessible by greater use of motor trucks and, in some areas, by new markets being organized. Veal calves in most areas are marketed a few at a time. A readily accessible market might therefore encourage some farmers to sell more calves as veal, and to sell each calf at a more desirable market weight—which likely would tend to be a heavier weight.

The rising trend of veal production is primarily a result of changes in milk cow numbers and not beef cow numbers. That an important quantity of "veal" continues to come from beef enterprises, however, is evidenced by average weights of all calves for slaughter being marketed at about 200 pounds in recent years. The proportion of veal calves to slaughter calves marketed varies not only from year to year but over the year with the heaviest marketings of slaughter calves occurring in the fall months.

Trend in prices of veal calves

Prices of veal calves when deflated by the index of all agricultural prices,[2] showed some evidence of an upward movement in price beginning about 1926 (Fig. 9). Prices during 1917-25 varied mostly between $6 and $7 per 100 pounds, and then went through two higher price

[1] Data not available prior to 1924. From *Farm Production, Disposition and Income from Milk* Series, U. S. Dept. Agr.

[2] Prices of veal calves are importantly interrelated with prices of other agricultural products. Further, they are strongly influenced by changes in consumers' income (see pages 30 to 33). In order to study the trend of prices of veal calves as related to production changes it is necessary to remove, as far as possible, the influence of changes in general economic conditions upon veal calf prices. A logical deflator from the standpoint of studying the trend of prices of veal calves as related to trend of veal production is the index of all agricultural prices, for the farmer or dairyman producing veal calves is influenced in his production enterprise by his alternative agricultural opportunities. The index of prices of all agricultural products, in which the price of veal calves has a relative importance of 1.77 percent, expresses the overall price position of agriculture.

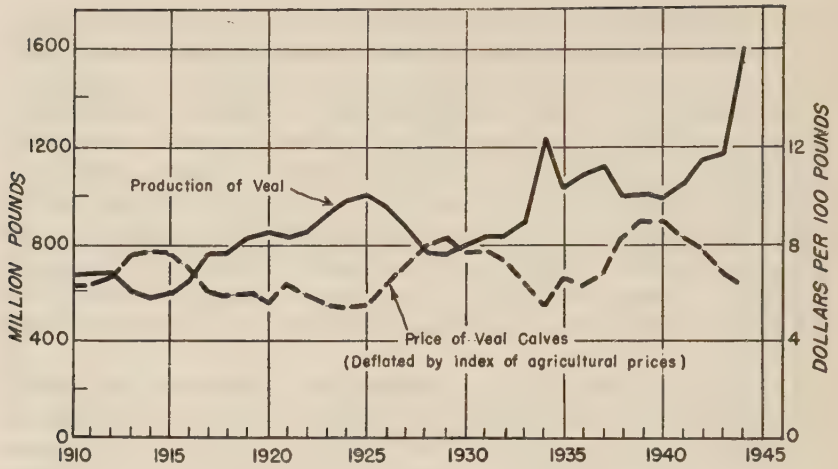

FIG. 9.— PRODUCTION OF VEAL AND DEFLATED PRICE OF VEAL CALVES, UNITED STATES, 1910-44

Data from *Livestock, Meats and Wool Market Statistics and Related Data,* 1943, pp. 97 and 68; from *Livestock and Wool Situation,* April 1945, p. 6; from the 1944 monthly issues of *Agricultural Prices,* U. S. Dept. Agr.; and from U. S. Dept. Agr. *1945 Outlook Charts,* p. 1.

cycles, 1925-34 and 1934-44 (possibly not the end year of the cycle). The peak of the first cycle was over $8 and of the second nearly $9. Thus, along with increased production and consumption (including increased per-capita consumption) of veal, the price of veal deflated by the index of prices of all agricultural prices, has averaged higher in recent years than formerly.

CYCLES IN PRODUCTION AND PRICE OF VEAL[1]

Three cycles of production of veal have occurred since 1899—in 1899-1914, in 1914-29, and in 1929-40 (Fig. 6, page 11). The first was of 15 years' duration,[2] the second of 15, and the most recent of 11. The 1929-40 cycle was less uniform in movement than the others, because of the influence of the severe 1934 and 1936 drouths on marketings of both slaughter and veal calves. The 1934 drouth, in particular, caused the marketing of many calves that would have been kept on farms had feed been available, and cut short the upward swing of the cycle of production of calves.

Comparison with cycles of beef production

Cycles of production of veal and beef have been similar with the exception of the cycle influenced by World War I, when beef produc-

[1] Includes the meat from both veal and slaughter calves.

[2] This cycle could be considered as starting with 1904; it would then be of 10 years' duration.

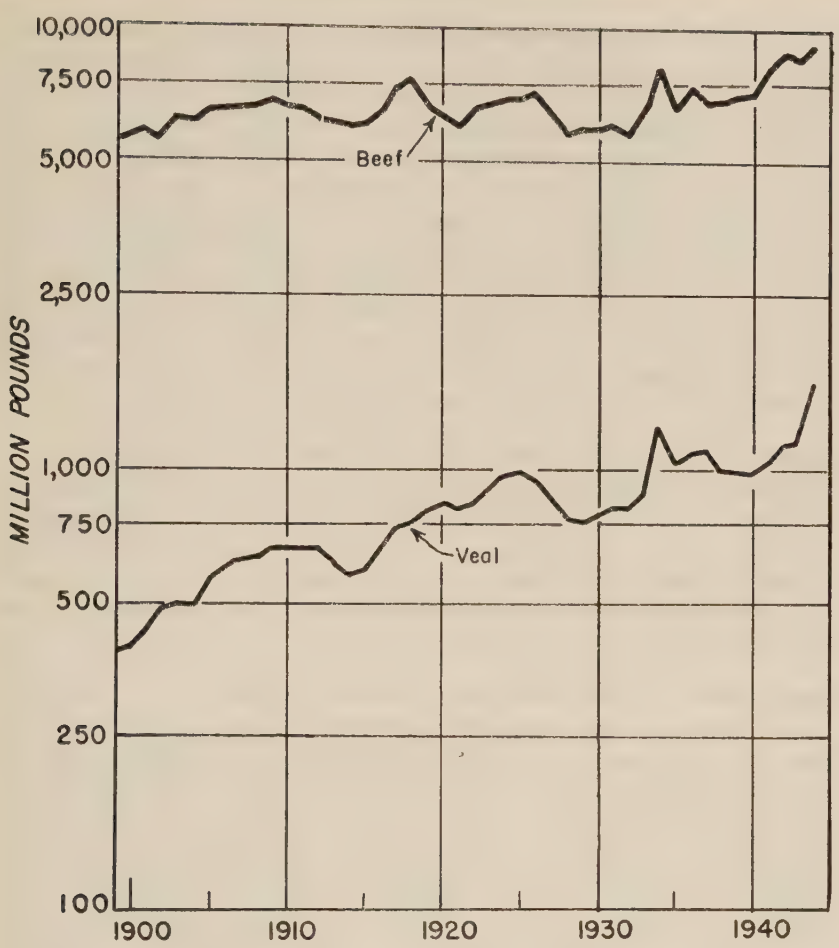

FIG. 10.— PRODUCTION OF BEEF AND VEAL, UNITED STATES, BY YEARS, 1899-1944

Data from *Livestock, Meats and Wool Market Statistics,* 1943, p. 97, and from *Livestock Situation,* April 1945, p. 6.

tion sharply increased during 1914-18 (Fig. 10). This sharp increase in production of beef was followed by some liquidation of beef breeding stock and declines in beef production in 1919 through 1921, whereas veal production continued upward to 1925.

Some degree of similarity in the cycles of production of beef and veal is to be expected because of the marketings of slaughter calves, basically part of the cattle production enterprise. Thus, the factors responsible for the cattle cycles would be of some influence on the cycles of veal production. Most writers have explained cattle cycles, whether of numbers, slaughter, or production, chiefly as a result of

imperfect forecasting of prices on the part of producers. Much of this imperfection is further based upon the accepted tendency of producers to give undue weight to present prices when planning in terms of future production. High prices for beef cattle thus encourage increased production by many producers. However, cattle production takes several years to expand or contract, and by the time a large number of producers have expanded their enterprise, the resulting large marketings have an adverse effect on prices. Producers then reduce their breeding stock and the cycle continues. The cycles of numbers of beef cattle on farms are more uniform than the cycle of slaughter, as there is some flexibility as to the weight and age at which cattle can be marketed. Undoubtedly many episodic occurrences such as drouths and wars influence and modify these cattle cycles.

Cycles of veal consumption related to total meat consumption

Annual consumption of veal as a proportion of total meat consumption showed a cyclical tendency (Fig. 7, page 11) quite similar to the cycles of veal production. Generally when production of veal was large, consumption also, as a proportion of total meat consumption, was large; and when production was low, consumption as a proportion of total meat consumption, was low.

Comparison of price cycles and production cycles

A rather close inverse cyclical relationship occurred between the production of veal with trend eliminated and the deflated price of veal calves during 1910-44 (Fig. 9, page 14). When production of veal was large, as in 1923-26 and 1934-37, deflated prices of veal calves were low. In turn, periods of small production of veal, such as 1913-16, 1928-32, and 1938-41, were accompanied by high prices of veal calves. High deflated prices for veal calves also occurred in years when veal consumption was low in relation to all meat consumption, and vice versa.

Cycles in prices of veal calves, milk cows, and beef cattle

A high degree of similarity occurred in the cycles of deflated prices[1] of veal calves, milk cows, and beef cattle during 1910-44 (Fig. 11). Similarity in the cycles of market supplies of veal and beef undoubtedly was the major cause of the closeness of the cyclical price movements of veal calves and beef cattle. Prices of milk cows evidently were greatly influenced by the price of cull milk cows sold for slaughter. It is logical to expect, in turn, that prices of slaughter cows were influenced to a high degree by the total supply of beef, of which the slaughter cows were a part. Such an explanation makes the similarity

[1] Prices received by farmers as reported by the U. S. Department of Agriculture divided by the index of all agricultural prices. See footnote 2, page 13.

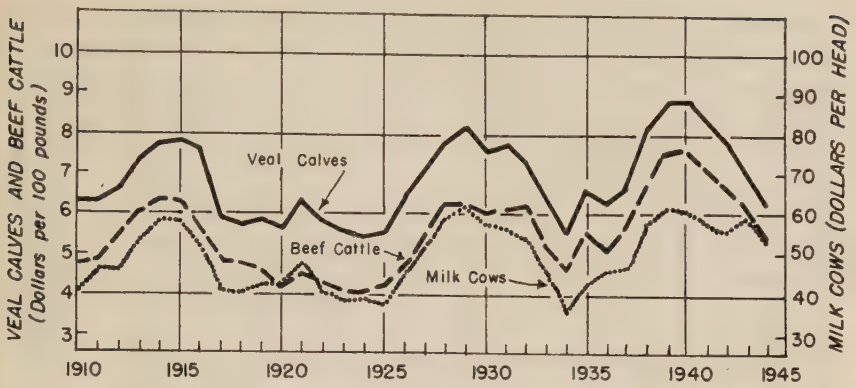

FIG. 11.— DEFLATED PRICES OF VEAL CALVES, BEEF CATTLE, AND MILK COWS, UNITED STATES, 1910-44

Prices deflated by index of prices received by farmers for all farm products, United States. Data from *Livestock, Meats and Wool Market Statistics and Related Data,* 1943, p. 68; from *Crops and Markets,* April 1945, p. 96; and from *1945 Outlook Charts,* p. 1.

in the price cycles of veal calves and milk cows dependent upon the high degree of price interrelation between beef cattle and slaughter cows and the influence of the price of slaughter cows on prices of milk cows.

Price ratios of butterfat and milk cows related to number of calves slaughtered

Influence of the production of slaughter calves upon the cycle of veal production was discussed previously. Factors that influence the cycles of marketings of veal calves are also of concern. As it is impossible to separate the data on marketings of veal calves from those of slaughter calves, it is likely that "number of calves slaughtered" would be a better indicator of changes in the marketings of veal calves than "veal production," which is influenced by the heavier weights of slaughter calves.

A recent study of the Bureau of Agricultural Economics explains in the following manner much of the change in the number of veal calves marketed annually:

"Production of veal calves is largely a byproduct of the dairy industry. When prices for dairy products are high in relation to prices for dairy cows, a large calf slaughter is brought about. Under conditions of relatively high dairy product prices, producers apparently tend to market a larger part of their heifer and bull calves as veal rather than to retain them as herd replacement or for future sale to other producers. On the other hand, low prices for dairy products relative to prices for milk cows tend to encourage the raising of more veal to weaning age."[1]

[1] "Relationship of Calf Slaughter to Prices of Dairy Products and Dairy Cows," *Livestock and Wool Situation,* September, 1944, p. 12.

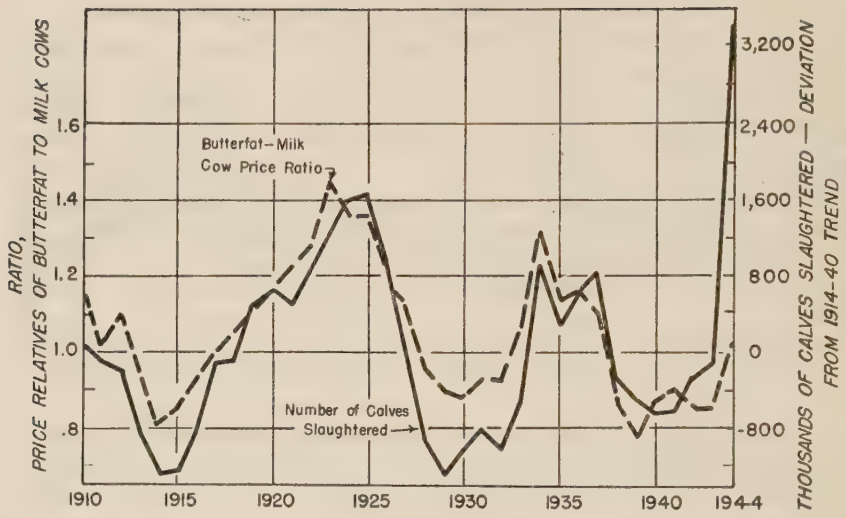

FIG. 12.— BUTTERFAT-MILK COW PRICE RATIO, AND NUMBER OF CALVES SLAUGHTERED (DEVIATION FROM 1914-40 TREND), UNITED STATES, 1910-1945

Prices for butterfat and milk cows are from the 15th of month price series as published by B.A.E., U.S.D.A. Basic data on number of calves slaughtered are from *Livestock, Meats and Wool Market Statistics*, 1944, p. 18.

The cyclical movements of the number of calves slaughtered (adjusted for trend[1]) and the ratio of price of butterfat to price of milk cows were similar during 1910-43[2] (Fig. 12). It is to be noticed that the peak (1923) in the ratio of price of butterfat to price of milk cows occurred two years prior to the peak of calf slaughter. After the abnormal conditions due to the 1934 drouth, the secondary peak of the price-ratio cycle in 1936 was followed by the secondary peak in the marketing of calves the following year. It is possible that these lags occurred because of a delay in producers' response to changes in the price ratio. Such lags, however, did not occur at the bottom of the cycle.

If farmers give consideration to the ratio of the price of butterfat to the price of milk cows in determining whether to veal or retain heifer calves, then the cycle of heifer calves saved should show an inverse cyclical relationship to the butterfat-milk cow price ratio. Such was the case during 1920-44[3] for the cycles of number of heifer

[1] Deviations were taken from the 1914-40 trend. Attention is called to the fact that this is a different means of trend elimination than was used in the study of the Bureau of Agricultural Economics (see footnote 1, page 17).

[2] The abnormally large slaughter of calves in 1944, as reported, was greatly influenced by the favorable position of veal in the meat-rationing system.

[3] Data are available on numbers of heifer calves on farms beginning with 1920.

calves[1] on farms per 100 cows 2 years old and over, were in inverse relationship to the cycles of the butterfat-milk cow price ratio.

In the short-time aspect, it is likely that some farmers, particularly those in areas where butterfat rather than whole milk is sold, also give consideration to the relative prices of butterfat and veal calves in deciding whether to market veal calves at heavy or light weights. A high ratio of price of butterfat to price of veal calves would discourage the use of milk in raising calves to heavier weights. This would mean an inverse relationship between the weight of veal calves slaughtered and the ratio of price of butterfat to price of veal calves.

COMPETITIVE POSITION OF VEAL

Some understanding of the competitive position of veal is essential to a price study for veal calves. With a given total supply of meat, consumers have the opportunity to buy the kinds and qualities of meat they prefer and can afford. With changing supplies of veal calves in relation to supplies of other meat animals, what have been the corresponding changes in price of veal calves in relation to prices of other meat animals?

Bases for Competition Between Meats

Different physical characteristics

Different meats have different physical characteristics and, because of these, different consumers have certain preferences for the various meats. Tenderness, texture, flavor, color, and juiciness vary from one kind of meat to another and, to a lesser extent, from one quality of a given meat to another. Distinctive characteristics of veal are the light pinkish brown color of the flesh, softness and firmness of texture of meat, and absence of generous fat distribution. Compared to the other meats and fowl, veal is high in protein, phosphorus, iron, and copper, but low in calories and vitamins.[2] Fresh veal is highly perishable.

Religious regulations or prohibitions

Consumption of meat by an important number of people is influenced by religious regulations or prohibitions. Orthodox Jews are prohibited by their faith from eating pork in any form, while beef, veal, lamb, mutton, and chicken may be eaten if slaughtered according to certain rules by "kosher schlachters." The Jewish law also requires that meat must be consumed within 72 hours after slaughter or be washed and reinstated by a representative of the church. The large

[1] In calculating the numbers of heifer calves on farms per 100 milk cows the numbers of heifer calves were lagged one year in relation to numbers of milk cows.

[2] Adapted from R. B. Hinman and R. B. Harris, *The Story of Meat*, Swift & Company, Chicago, 1942, pp. 240-245. The comparisons made by Hinman and Harris are approximate only.

Jewish population in the New York City area is an important factor in the large calf slaughter in that area.

Production, prices, and consumption

Variation in production of meat is the major factor affecting variation in consumption of meat in the United States. Production of the different kinds of livestock varies measurably from year to year and domestic consumption varies in about the same proportion.[1] From one year to the next, consumption of pork varies most. Beef consumption varies, but is more stable than consumption of pork. Veal consumption usually changes but little from one year to the next. All meat consumption, including chicken, usually ranges between 150 and 170 pounds per capita.

If all the meat produced is to be consumed, adjustment in price of the different meats must occur to bring about needed changes in consumption. These price changes do ordinarily occur and consumers do shift their consumption from one kind of meat to another in line with the variations in production of the different kinds of meat. Such shifts in consumption are evidence that meats from the different kinds of livestock are substituted for each other in the consumers' diets from year to year. The meats thus are to some extent in competition with each other in the market. The relation between price and consumption of meat has been well described, as follows:

"There are certain readily observable characteristics of the demand for meat which lead to an expectation of certain statistical relations between their demand curves, or to expectations regarding substitution curves. Meat plays a definite part in the diet of most people in the United States. Most meals are built around meat as the most important dish. Most people want meat at frequent intervals and will eat it rather often. Observation of common food habits leads to the conclusion that total meat consumption is probably influenced by price, most consumers being willing to vary their meat purchases within fairly wide limits as prices change. There is probably greater willingness to shift between kinds, cuts or qualities of meat than to shift from meat to other types of food. If porterhouse steak is high priced the housewife may buy round steak, or roast beef, or pork, or lamb. She may use some other type of food in place of meat, but probably only in response to high meat prices, and unwillingly."[2]

Price-Production Relations of Veal Calves and Other Kinds of Livestock

In this section of the study the question examined is, How have prices of veal calves behaved when production of veal calves relative to production of each of the other kinds of livestock has changed?

[1] Exports of beef and pork declined sharply after World War I and by the 1930's practically all meat produced in the United States was domestically consumed. After 1941 increased exports of meat resulted in less increase in domestic consumption than in production.

[2] Marion Clawson, "Demand Interrelations for Selected Agricultural Products," *Quart. Jour. Econ.* 57: 265-6, 1943.

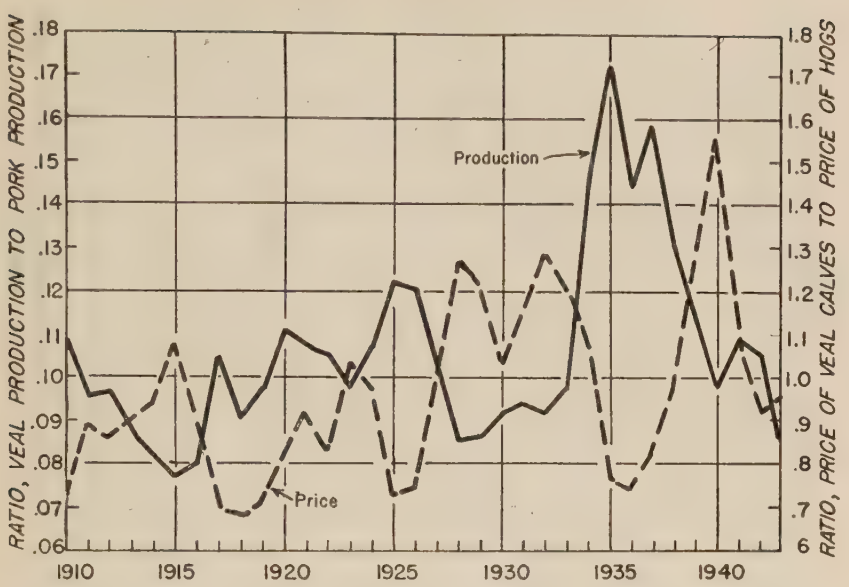

FIG. 13.— RATIO OF VEAL PRODUCTION TO PORK PRODUCTION AND CORRESPONDING RATIO OF PRICE OF VEAL CALVES TO PRICE OF HOGS, UNITED STATES, 1910-43

Data from *Livestock, Meats and Wool Market Statistics and Related Data,* 1943, pp. 97, 68, and 85; from *Agricultural Statistics,* U. S. Dept. Agr., 1938, p. 332; and from *Livestock and Wool Situation,* April 1945, p. 6.

Veal calves and hogs

Since 1910, the production of veal varied from 8 percent of that of pork in 1915 to over 17 percent in 1935 (Fig. 13). Over the whole period, 1910-43, there is evidence of increased production of veal in relation to production of pork.

Short-time increases in production of veal relative to pork production were accompanied, rather closely, by decreases in the price of veal calves relative to price of hogs (Fig. 13). Also, as the production of veal calves decreased relative to pork production, the price of veal calves relative to price of hogs increased correspondingly. The trend of price of veal calves relative to price of hogs rose during this period despite an accompanying upward trend in production of veal relative to pork production. This suggests that the market demand for veal calves increased relative to that for hogs during these 34 years.

Veal calves and sheep and lambs

Production of veal as a proportion of production of lamb and mutton varied materially during 1910-43 (Fig. 14). Veal production in 1914 was 82 percent of that of lamb and mutton, while in 1926 it was 164 percent. Both long-time and short-time changes in the production

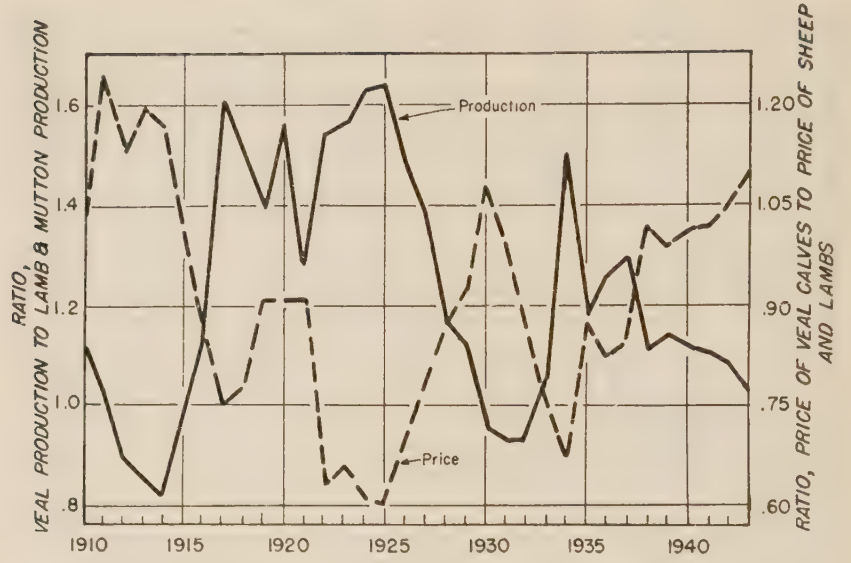

FIG. 14.—RATIO OF VEAL PRODUCTION TO LAMB (AND MUTTON) PRODUCTION AND CORRESPONDING RATIO OF PRICE OF VEAL CALVES TO PRICE OF SHEEP AND LAMBS, UNITED STATES, 1910-43

Data from *Livestock, Meats and Wool Market Statistics*, 1943, pp. 97, 85, and 68; from *Agricultural Statistics*, 1938, p. 332; and from *Livestock and Wool Situation*, April 1945, p. 6.

of veal relative to production of lamb and mutton were associated with inverse changes in the price of veal calves relative to price of sheep and lambs (Fig. 14). An exception to this inverse relationship occurred during 1917-21, a war period, for prices of veal calves did not decrease relative to those for sheep and lambs to the extent of the increase in the production of veal relative to that of pork.

Veal calves and cattle

Though short-time changes in production of veal calves relative to production of cattle were associated only to a minor degree with inverse changes in the price relationships (Fig. 15), the long-time trends of the price and production ratios were in opposite directions. Increase in production of veal from about 10 percent of that of beef in 1910-18 to 13 to 14 percent in 1920-26 was not associated with any measurable change in the relationship of the price of veal calves to price of cattle. The abrupt change in the ratio of production of veal to production of beef, from less than 10 percent in 1918 to nearly 13 percent in 1920,[1] was caused by the sharp decline in beef production accompanied by a

[1] This abrupt change could have been a result, at least partially, of change in designations of what was beef and what was veal.

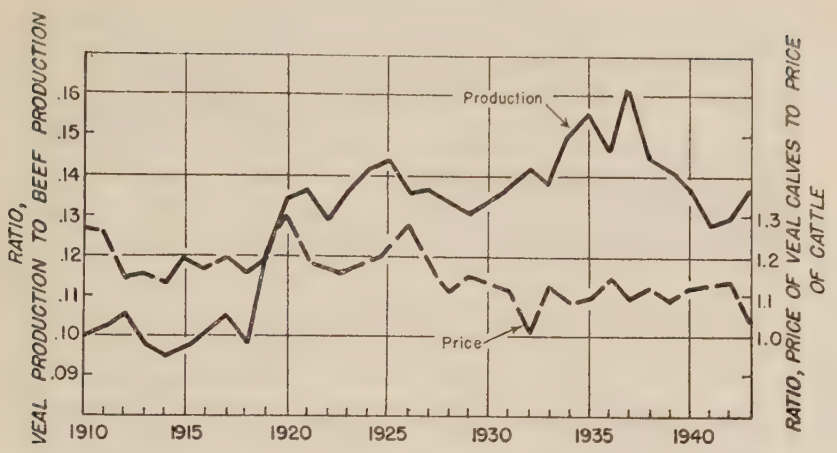

FIG. 15.— RATIO OF VEAL PRODUCTION TO BEEF PRODUCTION AND CORRESPONDING RATIO OF PRICE OF VEAL CALVES TO PRICE OF BEEF CATTLE, UNITED STATES, 1910-43

continued upward cyclical movement of veal production. Economic conditions caused by World War I influenced the cyclical movement of beef production more than of veal production.

Decrease in veal production relative to beef production from 1937 to 1941, however, was accompanied by a practically unchanged price relationship between veal calves and cattle. This suggests a decrease in the market demand for veal calves relative to market demand for cattle in the more recent years.

Of the price relationships between veal calves and each of the other kinds of livestock, that between veal calves and cattle showed the least variation. After the increase in veal production relative to beef production from 1910-18 to the period beginning in 1920, relatively small changes occurred in veal production as a proportion of beef production.

Some consideration has previously been given to the high degree of similarity in the price movement of veal calves and of cattle (see pages 16 and 17). The degree to which these prices followed similar courses during 1910-42 is indicated by a coefficient of correlations of .98 between the annual prices during this period (Table 1). Coefficients of correlations between prices of veal calves and hogs, sheep and lambs, and chickens were near .80. A fairly high degree of relationship is to be expected with prices of all livestock and meats being so importantly affected by demand conditions and general price-level.

A partial explanation of the high degree of price relationship between veal calves and cattle is the similarity of changes in production of veal and beef. Production of veal varied between the narrow limits of 9.5 and 10.5 percent of that of beef during 1910-18, but rose from less than 10 to over 13 percent from 1918 to 1920. From 1920 to 1939

TABLE 1.— RELATIONS BETWEEN PRICES OF VEAL CALVES AND OF HOGS, SHEEP AND LAMBS, CATTLE, AND CHICKENS; AND BETWEEN THE PRODUCTION OF VEAL AND OF EACH OF THE MEATS AND CHICKEN, UNITED STATES, 1910-42

	Coefficient of correlation of—	
	Prices	Production
Veal calves and hogs	.80	.39
Veal calves and sheep and lambs	.79	.53
Veal calves and cattle	.98	.59[a]
Veal calves and chickens	.78	.49

[a] For the period 1920-39 the coefficient of correlation was .88. A high degree of relationship also occurred during 1910-18.

the trend in production of veal relative to production of beef was slightly upward, but the annual deviations around this trend were rather small. The coefficient of correlation between the production of veal and of beef during this period was .88,[1] a much higher degree of relationship than between veal and any other meat for so long a period.

Veal calves and chickens

Major short-time changes in the production of veal relative to production of chicken were accompanied by inverse changes in the price relationships, but the level of the association between the production and price ratios differed (Fig. 16). Prices of veal calves were particularly high in relation to those for chickens during 1910-20, even when taking into consideration the relatively low production of veal in relation to production of chicken. The comparatively high ratio of veal calf prices to chicken prices during 1910-20 was due to unusually low chicken prices during this period. It is possible that such factors as the "noncommercialization" of chicken production, the highly decentralized marketing system, and the nonstandardization of the product during this period played an important part in the low prices for chicken compared to prices of veal calves and other meat animals.

Since 1920, the trend of the ratio of prices of veal calves to prices of chickens has been upward despite an upward trend in the production of veal calves in relation to production of chickens.[2] This suggests an increased market demand for veal calves relative to demand for chickens during this period, similar to that for veal calves relative to hogs.

Meaning of these relationships

Veal production was on an upward trend relative to the production of pork, beef, and chicken during 1910-43. Prices for veal calves, how-

[1] Partly a trend correlation.

[2] Attention is called to the fact that the chicken production series does not include broilers, the production of which has materially increased in the past 10 years. In 1934 commercial broiler production was less than 4 percent of total production of chicken meat, while in 1943 the percentage was about 18 percent. The inclusion of commercial broiler production would have lowered the ratio of production of veal to production of chicken, particularly since 1939.

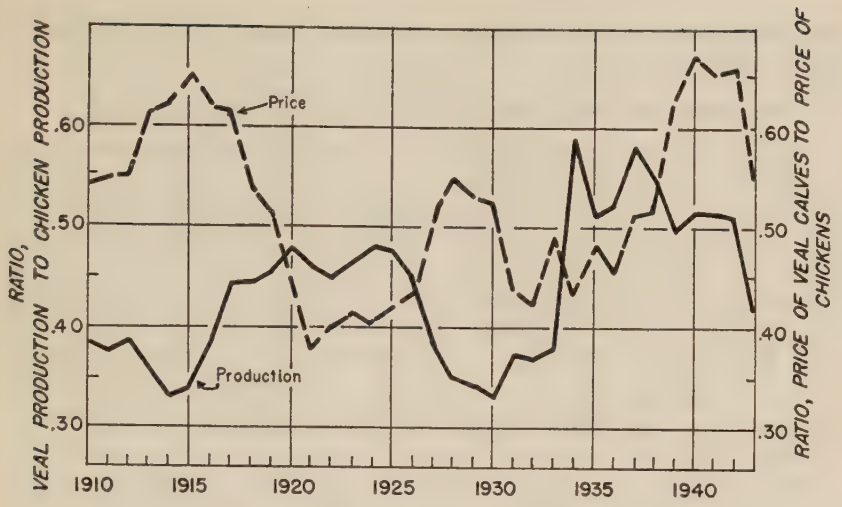

FIG. 16.—RATIO OF VEAL PRODUCTION TO CHICKEN PRODUCTION AND CORRESPONDING RATIO OF PRICE OF VEAL CALVES TO PRICE OF CHICKENS, UNITED STATES, 1910-43

ever, relative to those for hogs, beef cattle, and chickens did not show long-time downward trends correspondingly as great as the upward trends in production ratios of veal and each of these meats. Rather, prices of veal calves (1) increased relative to prices of hogs over the whole period; (2) increased relative to prices of chickens from 1921-43; and (3) declined relative to prices of beef cattle, but not at so great a rate as the increase in the production of veal relative to production of beef. Such analyses indicate that in the long-time aspect the market demand for veal calves increased relative to market demand for these three kinds of livestock. Since 1937, however, the decrease in production of veal relative to beef production was not accompanied by a corresponding increase in the price ratio of veal calves to beef cattle.

Somewhat differently, the production of veal compared to that of lamb and mutton was smaller after 1928 than during 1917-27, and the relatively decreased production of veal was accompanied by correspondingly higher prices for veal calves compared to those for sheep and lambs.

Major relative changes in the supply of veal over a period of several years compared to that of pork, lamb, and chicken were accompanied, in general, with corresponding inverse changes in price of veal calves relative to prices of those kinds of livestock. A relatively large supply of veal compared to that of pork, lamb (and mutton), and chicken was, in general, accompanied by relatively lower prices for veal calves than for hogs, sheep and lambs, and chickens. Also, periods of relatively low production of veal compared to that of pork, lamb (and mutton), and chicken, were periods when prices of

veal calves were relatively high compared to those for hogs, sheep and lambs, and chickens.

Demand Interrelations Between Veal and Other Meats

If one meat becomes high in price compared to another meat, it is reasonable to expect that if consumers will substitute one meat for the other, the consumption of the high-priced meat will decrease in relation to consumption of the low-priced meat. Adjustments which occurred in price and consumption between veal and the other meats from 1924 to 1942 were examined in this study by means of demand interrelation curves (Appendix, Figs. 24 to 27).[1] Retail prices used were those for New York City; consumption data were for the United States.[2] In general, though this analysis was tentative because of the quality of the data available, the following demand interrelationships stand out:

1. When the per-capita consumption of veal was small relative to that of pork, lamb, and chicken, prices of veal were high relative to prices of each of these meats. The converse also was true. In other words, changes in the supply of veal relative to supply of each of these meats were accompanied by varying degrees of inverse changes in the corresponding price ratios. When consumption (or production) of veal was large in relation to that of each of these meats, consumers paid comparatively less at the retail level for veal than for each of the other meats, and vice versa.

2. The price and consumption ratios of veal to pork and to lamb were more closely correlated than were those of veal to chicken and to beef.

3. Veal and lamb and veal and chicken were apparently in somewhat more competition with each other than were veal and pork.[3] Or, veal and lamb and veal and chicken were somewhat more substitutable for each other than were veal and pork. Between veal and beef the demand interrelations were too unstable during this period for definite conclusions to be drawn.

4. Veal apparently became decreasingly competitive with lamb and chicken as the ratio of veal consumption to lamb and chicken

[1] Clawson, in the article referred to on page 20, uses the term "price-consumption ratio charts" to describe these demand interrelation curves. These curves are determined from the price ratios of A to B commodity, plotted on a rectangular coordinate chart as the ordinate scale against the consumption ratios of A to B commodity on the abscissa scale. This type of chart has the advantage of dealing with four variables as though they were two.

[2] No adequate composite retail price series for veal is available for the United States as a whole. The series for New York City is used as representative of major price changes in the country as a whole. No retail price data on veal were available prior to 1924.

[3] As indicated by differences in the elasticities of the demand-interrelation curves.

consumption increased. On the other hand, veal apparently became increasingly competitive with pork with relatively high consumption of veal relative to consumption of pork.

FACTORS AFFECTING THE PRICE OF VEAL CALVES

The probable factors affecting the demand and therefore the price of veal calves are (1) the general level of consumers' demand; (2) changes in the composition and size of the domestic population; and (3) the value of important byproducts of veal calves. Probable supply factors affecting the price of veal calves, on the other hand, are (1) the quantity of veal calves marketed, and (2) the quantity of other meat animals marketed.

Consumers' Demand for Veal

Various available indexes measure the changes in wages, salaries, and income of different segments of the population. The correct index to use in a correlation analysis of veal-calf prices would be that which measures most adequately the income of the group that consumes most veal. Two questions in this connection need consideration: (1) What segments of the population consume the largest quantities of veal? (2) Is the relative level of consumers' income a factor in veal consumption?

Veal is essentially a specialty meat, though not so much a specialty meat as lamb. Veal is sold at fewer retail stores than beef and pork. Because of merchandising methods followed for specialty meats and the relatively high perishability of veal, it is likely that veal distribution is directed more to the larger cities than to stores servicing the rural areas. Further, those nationalities that are large consumers of veal, such as the French, Hebrew, and Italian, are mostly concentrated in the larger cities. Of the larger cities, New Orleans and Montreal, both having an important proportion of the population from French descent, have particularly high per-capita consumption of veal.

Consumers with high and medium incomes eat more veal per capita than do consumers with low incomes. A recent study of consumption of various commodities in 42 cities of the United States by the Bureau of Labor Statistics provides some factual information on the consumption of veal as related to income. The number of families surveyed was 14,469, including both white and negro families. Families with a total annual unit expenditure for all goods and services of $600 and over consumed 11.5 pounds of veal per person; those families with expenditures of $400 to $600, 9.3 pounds of veal per person; and those with expenditures of under $400, 6.6 pounds of veal per person (Table 2). Less affected by the amount of total expenditures was the stew meat, while the consumption of steaks and chops was directly related to the level of expenditure.

TABLE 2.—ESTIMATED QUANTITY OF VEAL PURCHASES PER PERSON IN ONE YEAR (AVERAGE OF 1934-36), BY LEVELS OF ANNUAL EXPENDITURES[a]

(Average of 14,469 white and negro families in 42 cities)

Item	Annual per-capita consumption of veal by families with total annual unit expenditure for all goods and services of —			Annual per-capita consumption of veal, all families
	Under $400	$400 to $600	$600 and over	
	lb	*lb*	*lb*	*lb*
Steaks and chops	2.8	4.6	6.2	4.1
Roast	2.3	3.1	3.5	2.8
Stew	1.5	1.6	1.8	1.6
Total veal	6.6	9.3	11.5	8.5

[a] Adapted from *Money Disbursements of Wage Earners and Clerical Workers, 1934-36, Summary Volume*, by Faith M. Williams and Alice C. Hanson, U. S. Bur. Labor Statis. Bul. 638, Pt. II, 1941, p. 237, Table A-2.

That nonfarm families of high income consume substantially more veal, per capita, than do those of low income is evidenced by the following data for 1941 from a study[1] published by the Bureau of Agricultural Economics:

Income Level	*Veal consumed per capita, pounds*[a]
Under $500	4.1
$ 500 - $ 999	4.9
$1,000 - $1,499	6.9
$1,500 - $1,999	8.1
$2,000 - $2,999	9.7
$3,000 - $4,999	11.3
$5,000 and over	14.0

[a] Not including military and institutional groups.

Families in the United States with incomes over $3,000 thus consumed about three times as much veal, per capita, in 1941 as did families with incomes of less than $1,000.

Though the two studies just discussed show that persons of high and medium income[2] consume more veal per capita than do consumers with low incomes, it must be remembered that an important number of the total consumers are in the low-income classification. Each of those studies showed only what consumption accompanied a certain level of income for a specific period of time. It does not directly follow that a change in income status from one year to the next would be followed by an increased purchase of veal because the price of veal and other commodities may have changed as well as income.

An index of demand conditions used to represent consumers' demand for veal should give greater weight to the income of urban consumers, per capita, than to rural consumers, inasmuch as urban dwellers

[1] Adapted from *High-level Food Consumption in the United States*, by Williard W. Cochrane, U. S. Dept. Agr. Misc. Pub. 581, Dec. 1945, table 16, p. 46.

[2] While the Bureau of Labor Statistics study was in terms of total expenditures for all goods and services, it is shown in that study (p. 56) that there is a close relationship between income and expenditure.

have the higher per-capita consumption of veal (see pages 10 and 27). What groups of urban consumers are the main consumers of veal, however, is not so well established. Those people, in cities, of French, Polish, and Jewish descent are large consumers of veal, according to several research workers. The "white collar" group is also credited with a comparatively higher consumption of this specialty meat. The industrial districts of the Northeast are given as an area where demand for veal is strong. Taken as a whole, present information indicates that an index that measures the consumers' demand of the combined urban groups is satisfactory and logical as a general demand variable for veal. The index of nonagricultural income would thus seem satisfactory as a measure of the demand for veal.

Changes in Size and Composition of Domestic Population

The total population of the United States increased from about 108 million in 1921 to about 136 million in 1943.[1] Material changes also occurred in the proportions of nonfarm and farm population. In general, up to the World War II period, the farm population remained relatively stable, from 30 to 32 million, while the increase that occurred in the total population was mainly in the nonfarm population.

An annual increase in the urban population means a larger total of potential consumers of veal and thus might affect the annual price of veal calves. With veal being consumed primarily by this nonfarm population, changes in the population of this group might be significant in influencing the demand for veal. The index of nonagricultural income, previously chosen to represent the consumers' demand for veal, reflects both changes in the number of urban workers, and changes in the income received per worker. Adjustment of this index to a per-capita basis tends to eliminate the influence of changes in population as a variable.

Value of Byproducts of Veal Calves

While veal is the major product of veal calves, the value of calfskins ranged from 10 to 22 percent as much as the liveweight value of a veal calf during 1921-41. The value of the skin as a proportion of the value of the carcass is higher for calves than for cattle because of the strong demand for the fine leather which calfskins produce. It is logical that packers should give weight to changes in the value of calfskins in their competitive buying of veal calves.[2]

It is difficult to satisfactorily include the importance of byproducts as a factor in a multiple correlation analysis. If the price of calfskins were used this price might be, to an important extent, a function of

[1] *Population Estimates, 1910-43,* U. S. Dept. Agr. Bur. Agr. Econ. Mimeo., Dec., 1943.

[2] "Hides and Leather as Cattle By-products," *Armour's Livestock Bureau Monthly Letter to Animal Husbandmen,* 15 (4): 1, 1937.

the price of veal calves. Then too, as noted in the above paragraph, it is likely that there would be a high degree of intercorrelation between the demand variable used for veal and this price variable. If the supply of calfskins were used the chances of unsound statistical procedure would not be eliminated, for the supply of calfskins would be a function of the number of calves slaughtered, and high intercorrelation could again result between the two independent variables. For these reasons the value of calfskins was not used as an independent variable. It was felt that changes in other independent variables used accounted for the major changes in the value of calfskins.[1]

Quantity of Veal Calves Marketed

The average weight of calves[2] marketed varies from year to year. Since 1921, and particularly since 1934, the trend has been toward heavier calves. For this reason, the total production of veal[3] or the total weight of calves marketed seems most satisfactory as a measure of supply. In line with the other variables, production of veal was reduced to a per-capita basis.

Supply of Other Meat Animals and Chickens

It seems reasonable that each kind of meat competes, in varying degrees, with other kinds of meat. In a previous section on demand, or substitution, interrelations between veal and each of the meat animals and chickens, it was pointed out that during 1924-42 veal and lamb, and veal and chicken were apparently in competition to a slightly greater degree than were veal and pork or veal and beef.[4]

Other writers concerned with what meats are most in competition with veal are not in agreement, yet all basically recognize some competition between veal and other meats. In the following correlation analysis, all meat, other than veal, was used as an independent variable. Production of meats, other than veal, was reduced to a per-capita basis.

Correlation Analysis of the Factors

Investigation of factors affecting the price of veal calves was carried out by means of correlation analysis. While several analyses yielded high correlation coefficients, the one that seemed the most explainable had the following variables:

X_1 = 15th-of-month price of veal calves for the United States, yearly weighted average (dollars per 100 pounds)[5]

[1] This does not mean that the value of calfskins is not of some influence on the price of veal calves.

[2] As stated previously, data are not available on marketing of veal calves alone, but are a combination of slaughter calves and veal calves.

[3] Including the meat from veal calves and slaughter calves.

[4] Based upon the 1928-38 demand interrelation between veal and beef.

[5] See appendix for data.

X_2=Annual average index of nonagricultural income per capita (1935-39=100)
X_3=Annual index of production, per capita, of veal (1935-39=100)
X_4=Annual production, per capita, of other meats (pork, lamb and mutton, chicken, and beef combined).

The mathematical, or least-square method, was used in the working of the correlation. Scatter diagrams shown in Fig. 17 were obtained by the use of the graphic method with the slope of the regression lines

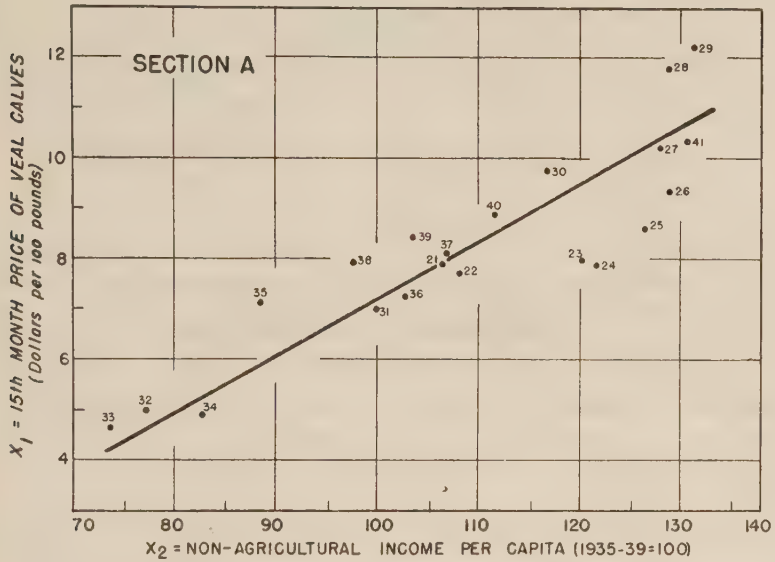

FIG. 17A.— FACTORS AFFECTING PRICES OF VEAL CALVES, UNITED STATES, 1921-41

determined by the mathematical method. This analysis showed a high coefficient of correlation between the dependent and three independent variables ($\overline{R}_{1.234} = .972$), highly significant when tested by the analysis of variance.[1] The standard error of estimate of the dependent variable was 48 cents per 100 pounds.

[1] For a coefficient of correlation with 21 cases and three independent variables to meet the test of high significance, a coefficient of at least .69 must result (F. A. Pearson and K. A. Bennett, *Statistical Methods,* John Wiley and Sons, 1942, Table I). This means that from a universe of zero correlation the probability is that only once in 100 times would a random sample occur which would give a coefficient of correlation as high as .69. Naturally, it must be recognized that this test is applied to a correlation analysis involving time-series data that are not fully random samples. Further, the data may not be of normal distribution; but the coefficient of correlation (.972) is far enough above that needed for high significance (.69) for the association between the price of veal calves and the three independent variables to be termed highly significant. Testing the significance of this association in another way, the size of the calculated variance ratio of F of 105.7 was much greater than the 99 percent value of F of 5.18.

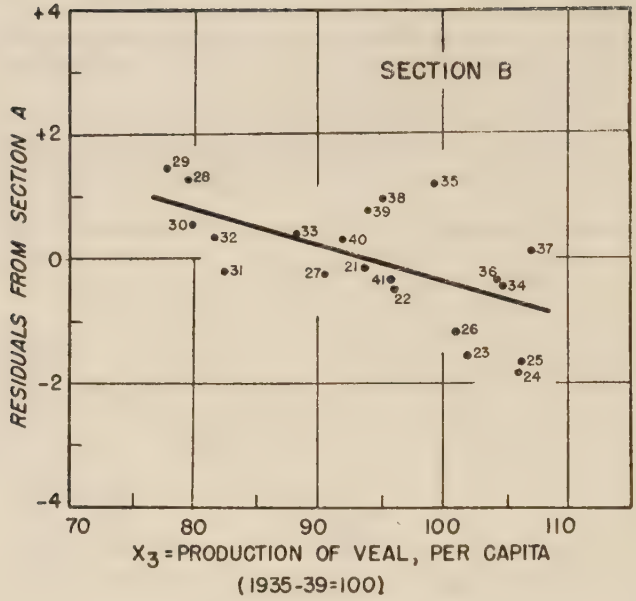

FIG. 17B.—FACTORS AFFECTING PRICES OF VEAL CALVES, UNITED STATES, 1921-41

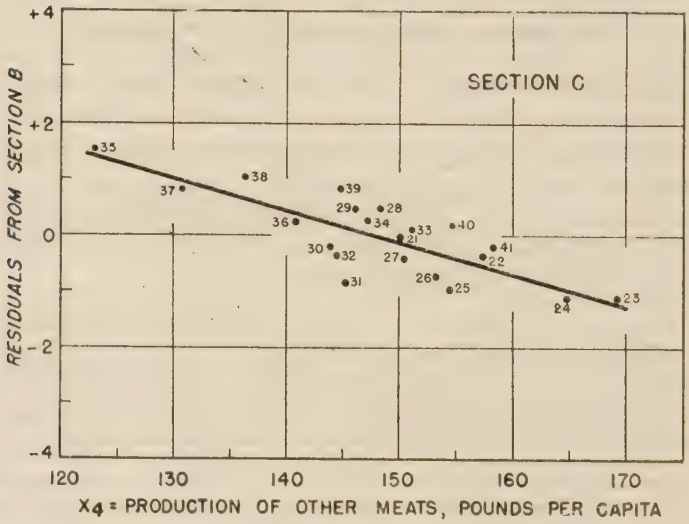

FIG. 17C.—FACTORS AFFECTING PRICES OF VEAL CALVES, UNITED STATES, 1921-41

Of the three independent variables, nonagricultural income per capita was nearly twice as important in accounting for price changes as were the combined effects of the other two independent variables, production of veal per capita and production of other meats per capita.[1] The latter two independent variables were of about equal magnitude in accounting for price changes.

Thus the primary factor in determining prices of veal calves was the level of consumers' income within the framework of the factors used for the period 1921-41. Compared to nonagricultural income as a factor affecting prices of veal calves, the production of veal and the production of other meats were of much less importance.

The regression equation for this correlation was:

$$X_1 = 10.51 + .1130\,X_2 - .0568\,X_3 - .0558\,X_4$$

The effect of each of the independent variables upon the price of veal calves can be stated as follows: (1) A change of 10 points in the index of nonagricultural income per capita (the other two factors being held constant at their average in this and the following statements) was associated, on the average, with a change of price of veal calves of about $1.13 per 100 pounds. (2) A change of 10 points in the index of per-capita production of veal (equivalent to .8 of a pound) was associated on the average with an inverse change in the price of veal calves of about $0.57 per 100 pounds. (3) A change of 10 pounds in the production of other meats, per capita, was associated, on the average, with an inverse change in the price of veal calves of about $0.56 per 100 pounds.

Correlation analysis provides a statistical tool to evaluate the closeness of the relationship between the annual prices of veal calves during 1921-41 and the combination of the three independent factors. It also provides a means of arriving at the approximate importance of each of the independent variables upon the changes in the price of veal calves. The factors, nonagricultural income per capita, the production of veal, and the production of the meats other than veal, seem logical as factors affecting the price of veal calves. Major changes in the meat-eating habits of consumers, increases in each of the independent variables beyond the ranges that occurred during 1921-41, and artificial control of prices in varying degrees, all have arisen during these past war years. The history of prices of veal calves during 1921-41 and the factors affecting those prices do, however, provide evaluation as to the annual movement of veal calf prices in a 21-year period ending prior to the major influence of the past war upon prices.

[1] Beta coefficients were: $B_{12.34}=1.02$; $B_{13.24}=.27$; and $B_{14.23}=.30$.

PRICES AS RELATED TO QUALITY DIFFERENCES

Price reporting of veal calves on a grade basis first occurred in July, 1925, but it was not until the early thirties that grade-price reporting was begun at many of the terminal markets. Even since 1925 the method of price reporting has been such that prices are available only for combinations of closely related grades and these combinations have been changed several times.

The following market classification for veal calves, showing class, weight, and grade groups has been proposed by the United States Department of Agriculture. Market prices for all these grades are not yet being reported.

Class and weight	*Grade*
Lightweight, 110 pounds or less	choice good medium common cull
Mediumweight, 110 to 180 pounds	prime choice good medium common cull
Heavyweight, 180 pounds or more	prime choice good medium

Grade-Price Differences at Four Terminal Markets

Grade prices of veal calves differ between markets and at different times. In this section only annual prices at four terminal markets are used in the analysis. Three of these terminal markets, Jersey City, Louisville, and Cincinnati, are important markets for Kentucky calves. The fourth, Chicago, is one of the larger markets for veal calves, and for it one of the most complete series of prices of veal calves is available.

Price-levels at the four terminal markets

The prices of veal calves at the four markets have differed somewhat from year to year and also as averages of different periods of years. For good and choice veal calves, on the whole, prices at Jersey City have been higher than at Louisville, Cincinnati, and Chicago. In 1932-34, years of rather stable prices, prices of good and choice vealers at Jersey City exceeded those at Chicago by $1.41, those at Cincinnati by $1.47, and those at Louisville by $2.44 (Table 3). Prices

TABLE 3.—AVERAGE GRADE PRICES AND DIFFERENCES BETWEEN GRADE PRICES, JERSEY CITY, CHICAGO, LOUISVILLE, AND CINCINNATI, 1932-34 TO 1941-42[a]

(Dollars per 100 pounds)

Market	Prices by grades			Difference in price between grades		
	Good-choice	Medium	Cull-common	Good-choice and medium	Good-choice and cull-common	Medium and cull-common
1932-34						
Jersey City	7.47	5.77	3.73	1.70	3.74	2.04
Chicago	6.06	4.84	3.71	1.22	2.35	1.13
Louisville	5.03	3.94	2.77	1.09	2.26	1.17
Cincinnati	6.00	4.96	3.65	1.04	2.35	1.31
Average	6.14	4.88	3.46	1.26	2.68	1.41
1935-40						
Jersey City	11.09[b]	8.98[c]	6.66	2.11	4.43	2.32
Chicago	9.74[b]	8.05[c]	6.39	1.69	3.35	1.66
Louisville	9.66[b]	7.95[c]	5.75	1.71	3.91	2.20
Cincinnati	10.08[b]	8.68[c]	6.70	1.40	3.38	1.98
Average	10.14	8.42	6.38	1.73	3.77	2.04
1941-42	Good-choice	Common-medium	Cull	Good-choice and common-medium	Good-choice and cull	Common-medium and cull
Jersey City	14.55	11.50	8.57	3.05	5.98	2.93
Chicago	13.33	10.90	8.28	2.43	5.05	2.62
Louisville	14.31	11.70	8.48	2.61	5.83	3.22
Cincinnati	13.52	11.08	8.00	2.44	5.52	3.08
Average	13.93	11.30	8.33	2.63	5.60	2.96

[a] Prices from mimeographed annual summaries of livestock prices for each market as prepared by Livestock, Meats and Wool Division, B.A.E., U.S.D.A.

[b] The price for good-choice grade for 1938 and January-June of 1939 is an average of the separate prices for good and for choice grades.

[c] For the last 6 months of 1939 and for 1940 the common-medium grade price is used as a price for the medium grade as the medium grade price was not given separately.

at Jersey City of medium grade vealers exceeded those at Cincinnati by $0.81, those at Chicago by $0.93, and at Louisville by $1.83.[1]

[1] The limitations involved in comparison of prices at different markets are recognized. The monthly average prices from which the annual prices are derived are compiled in the following manner. Different market reporters of the U. S. Department of Agriculture report the prices for veal calves each sale day on each of these markets. Different reporters may or may not be on the same market from year to year. From the range in prices for each day for each grade of veal calves, the market reporter prepares a weekly summary of grade prices, by taking an average of the range of prices during the week. Monthly prices are derived by averaging these weekly averages. Grade price reporting is theoretically the same from market to market, but differences in range of prices due to differences in quality within the grade could affect these prices. To illustrate, if there were better calves of *good* grade on market A than on market B, the upper limit of the price range for the grade might tend to be higher at market A. Thus, it is possible that the average quality within a grade and the range of quality within the grade might affect the price quotations. Further, although standards have been set up for veal calves, it is probable that different price reporters interpret the standards differently in actual practice. That this is probably done is borne out by judging at livestock shows, where different judges, experts on grading, do not always rank the animals in the same order of quality. The physical characteristics of livestock are such that grading cannot be so exact for this commodity as for such agricultural products as grain.

There is a tendency, also, for the reporter at a given market to follow the long-standing policy of grade-reporting at that market. With market practices of grading at some markets differing from those at others, this probably is a factor influencing the reported prices.

The price relationships between these markets have changed in recent years. In 1935-40, years of about the same level of annual prices, prices of good and choice vealers at Jersey City were higher than those at Cincinnati by $1.01, those at Chicago by $1.35, and those at Louisville by $1.43 (Table 3). In 1941-42, years of higher prices, prices of good and choice vealers at Jersey City exceeded those at Louisville by $0.20, those at Cincinnati by $1.03, and those at Chicago by $1.22. The Louisville price for medium grade vealers was $0.20 above Jersey City, $0.62 above Cincinnati, and $0.80 above Chicago prices.

Prices at Louisville thus increased in the more recent years in relation to those at the other markets. What part of this price increase, if any, was due to changes in grading and price reporting at Louisville is not known. It is known, however, that this market (1) maintained its receipts of calves during the period of the growth of the auction markets, and (2) increased its receipts of calves compared to those of all terminal markets combined.

Price differences between grades

Price differences between grades have usually been greater at Jersey City than at the other three markets (Table 3). The price difference between choice and medium veal calves at this market averaged $1.70 per 100 pounds in 1932-34; $2.11 in 1935-40, when prices were at a generally higher level; and $3.05 in 1941-42, when prices were still higher. At Louisville the differences between these same grades for the same years were $1.09, $1.71, and $2.61. The differences at Cincinnati were somewhat less than at Louisville, and at Chicago they were somewhat more than at Louisville in 1932-34, and somewhat less in 1935-40. For the four markets combined, the average differences were $1.26 in 1932-34, $1.73 in 1935-40, and $2.63 in 1941-42.

Grade-price differences as related to level of prices

Price spreads between grades of veal calves were wider when prices were high than when they were low (Table 4). The tendency was for the ratio of medium-grade price to good-and-choice price to increase as the price of veal calves increased. With an average price of $6.14 at the four markets in 1932-34, the price of medium grade veal calves was 80 percent of the good and choice price. With an average price of $10.14 in 1935-40, the price of medium grade veal calves was 83 percent of that for the good and choice price. The combining of common with medium grade price quotations in 1941-42 period makes an exact comparison impossible, but had medium and common grade prices been separated as in 1937, the medium grade price probably would have been 87 to 89 percent of the good and choice price.[1]

[1] Price ceilings on veal may have been a factor responsible for the increase of the price of medium grade veal calves in relation to that for good and choice veal calves.

TABLE 4.—RELATIVE PRICES OF GRADES OF VEAL CALVES AT JERSEY CITY, CHICAGO, LOUISVILLE, AND CINCINNATI, 1932-34 TO 1941-42[a]

Place	Medium as percentage of good choice	Cull-common as percentage of good-choice	Cull-common as percentage of medium
1932-34			
Jersey City	77	50	65
Chicago	80	61	77
Louisville	78	55	70
Cincinnati	83	61	74
Average	80	57	72
1935-40			
Jersey City	81	60	74
Chicago	83	66	79
Louisville	82	60	72
Cincinnati	86	66	77
Average	83	63	76
1941-42	Common-medium as percentage of good-choice	Cull as percentage of good-choice	Cull as percentage of common-medium
Jersey City	79	59	75
Chicago	82	62	76
Louisville	82	59	72
Cincinnati	82	59	72
Average	81	60	74

[a] Based upon data in Table 3.

Grade Price Differences at Four Central Kentucky Auction Markets

Most veal calves were sold on a pen-lot basis at the four Central Kentucky auction markets (located at Danville, Lexington, Paris, and Winchester) included in this study. Calves were graded into lots of similar quality by employees of the auction markets. Grades used were those of the individual markets, not federal grade standards. Calves were graded into pen lots so as to sell in units of quantity and quality appealing to order and packer buyers; and so as to speed up the selling process by selling in larger units.

Weight distribution of calves sold

The weights of calves sold in pen lots at these markets during the period 1937-43 were distributed in the following manner:

200 to 265 pounds	6.0 percent
165 to 200 pounds	69.8 percent
140 to 165 pounds	8.7 percent
115 to 140 pounds	4.9 percent
Not segregated on weight basis	10.6 percent[1]

Nearly 70 percent of all the veal calves were thus sold in pens that averaged in weight between 165 to 200 pounds. The average weight of all calves sold during 1937-43 varied annually between 172 and 189 pounds, averaging 180 pounds for the 7-year period.

[1] Includes some pens falling within the weight classes as given and calves of individual ownership sold as a unit.

Majority of calves sold in "top pen"[1]

The 165-to-200-pound weight group was divided into "top pens" and "second pens." From 46 to 62 percent of all veal calves were sold in the top pen each year from 1937 through 1943, the average for the 7-year period being 57 percent. The annual average weight of these top pens varied within the narrow limits of 185 to 192 pounds and averaged 188 pounds for the 7 years. An additional 13 percent of the calves of this weight group sold in the second pens of only a slightly lower weight but at lower prices than the top pens.

Prices[2] as related to weight distribution

The average prices per 100 pounds for pen-lots of calves in the different weight groups for the 7-year period 1937-43 were:

200 to 265 pounds	$11.18
165 to 200 pounds	12.08 (top pens)
	10.59 (second pens)
140 to 165 pounds	10.57
115 to 140 pounds	9.94
Average of all weights	11.44

Thus the average price for calves sold in the top pens for the 7-year period was $0.90 higher than for calves in the 200-265 pound group and $1.49 higher than for calves in the second pens of the 165-200 pound group. Further, the average price of calves in the second pens of the 165-200 pound group was practically the same as the average price for the 140-165 pound group and only $0.65 higher than the average price for the 115-140 pound group.

Some variation in price differences between weight groups (Tables 5 and 6) occurred from year to year. The price difference between calves in the top pens (165-200 pounds) and in the 200-265 pound weight group narrowed from $1.19 per 100 pounds in 1939 to $0.50 in 1943,[3] despite the general upward movement of prices of veal calves. On the other hand, the price difference between calves in the top pen and in the 115-140-pound weight group widened from $1.50 per 100 pounds in 1938 to as much as $2.87 in 1942. Rather constant was the price difference between calves in the top pens and the seconds in the same weight group despite a material change in the level of veal prices during this period.

[1] The top pen was the highest-priced pen of calves of any sizable number. Occasionally, a pen with a small number of calves would be slightly higher in price, but these pens were excluded in the segregation.

[2] Attention is called to the procedure used in the segregation of these pen lots. For each sale only the highest-priced pen of each weight group, other than the second pens of the 165-200 pound group, were included in the price data. Essentially this means the prices of the best calves of each weight group, other than for the second pens of the 165-200 pound group, were used. This procedure, however, excluded only 10.6 percent of all the calves for the 7-year period.

[3] Numbers of calves in the 200-265 pound weight group increased from 3.9 percent of the total in 1939 to 12.1 percent in 1943.

TABLE 5.— AVERAGE PRICES OF VEAL CALVES SEGREGATED INTO DIFFERENT WEIGHT GROUPS, FOUR CENTRAL KENTUCKY AUCTION MARKETS, 1937-43

(Dollars per 100 pounds)

	200-265 lb	165-200 lb		140-165 lb	115-140 lb	Weighted average
		Top pens	"Seconds"			
1937	9.52	10.39	9.07	8.91	8.82	9.87
1938	8.87	9.95	8.64	8.70	8.45	9.54
1939	9.03	10.22	8.81	8.95	8.59	9.74
1940	9.28	10.39	8.79	8.86	8.31	9.79
1941	11.57	12.35	10.77	10.60	9.66	11.72
1942	14.42	15.14	13.49	13.44	12.27	14.36
1943	15.59	16.09	14.53	14.53	13.50	15.06
Average, 1937-43	11.18	12.08	10.59	10.57	9.94	11 44

TABLE 6.— AMOUNTS BY WHICH PRICES OF VEAL CALVES IN TOP PENS EXCEEDED THOSE IN OTHER WEIGHT CLASSIFICATIONS, FOUR CENTRAL KENTUCKY AUCTION MARKETS, 1937-43

(Dollars per 100 pounds)

Year	Difference between top-pen price and price of calves in weight groups of —			
	200-265 lb	165-200 lb ("Seconds")	140-165 lb	115-140 lb
1937	.87	1.32	1.48	1.57
1938	1.08	1.31	1.25	1.50
1939	1.19	1.41	1.27	1.63
1940	1.11	1.60	1.53	2.08
1941	.78	1.58	1.75	2.69
1942	.72	1.65	1.70	2.87
1943	.50	1.56	1.56	2.59
Average, 1937-43	.89	1.49	1.51	2.13

Price of Calves Related to Sale Weight, New York

Matzen, in a study of marketing of livestock in New York, presented information on the distribution of average weights of calves when sold from 350 New York farms in 1936-37, and the price received for the calves of different weights (Table 7). As the weight of these calves increased so did the price received per 100 pounds. Largest change in the price from one weight group to the other was from an

TABLE 7.— AGE AND PRICE OF CALVES SOLD FOR SLAUGHTER AT VARIOUS WEIGHTS, 350 NEW YORK FARMS, 1936-37[a]

Weight when sold	Calves sold		Average weight	Average age	Average price received	
	Number	Percent			Per head	Per 100 lb
			lb	days		
Under 60 lb	120	3	51	4	$ 1.81	$ 3.55
60 to 80 lb	1,439	31	69	4	2.99	4.33
80 to 100 lb	2,243	49	85	4	4.44	5.22
100 to 120 lb	332	7	103	8	5.95	5.78
120 to 140 lb	140	3	126	27	10.18	8.08
140 to 160 lb	201	4	146	34	12.09	8.28
160 lb or over	155	3	182	37	15.70	8.62
All weights	4,630	100	88	8	4.91	5.61

[a] E. H. Matzen, *Livestock Marketing in New York State*, unpublished doctoral dissertation, Cornell University, Ithaca, N. Y., September 1939, p. 88.

TABLE 8.—PERCENT OF RECEIPTS AND PRICES RECEIVED FOR CALVES OF VARIOUS WEIGHTS, BUFFALO AND JERSEY CITY, 1936-37[a]

Weight, pounds	Percent of receipts		Average weight		Average price per cwt.	
	Buffalo	Jersey City	Buffalo	Jersey Ciey	Buffalo	Jersey City
			lb	lb		
Under 80	5	14	69	69	$ 4.94	$ 5.82
80 to 100	13	20	87	88	6.28	7.04
100 to 120	10	13	106	108	7.76	8.29
120 to 140	18	11	128	130	9.44	9.96
140 to 160	19	14	147	150	10.35	11.11
160 to 180	17	19	167	170	10.74	11.63
180 to 200	11	6	185	184	10.76	10.41
200 to 220	4	1	203	210	10.17	8.80
220 and over	3	2	245	287	9.39	7.83
All weights	100	100	140	127	8.57	9.60

[a] Matzen, p. 266. Based on data for one week of each month.

average price of $5.78 per 100 pounds for calves in the 100-120 pound group to $8.08 for calves in the 120-140 pound group.

Prices as related to weight of calves marketed in 1936-37 also were given by Matzen for the two markets, Buffalo and Jersey City (Table 8). Prices increased as weight increased up to the 160-180 pound group at Buffalo, and the 180-200 pound group at Jersey City. Calves in the heavier weight groups at each of these markets sold at decreasing prices as the weights increased.

Comparison of Prices of Veal Calves and Slaughter Calves

Many calves marketed from Kentucky farms are from milk cows bred to beef bulls.[1] These calves are marketed as veal calves, slaughter calves, "heavy fat calves," or occasionally as stocker calves. While by far the largest number are sold as veal calves, the number being sold as "heavy fat calves" is increasing. The number of calves of this breeding sold as slaughter calves and as stocker calves probably is quite small, yet deserving of attention in a price study.[2]

Prices of veal calves can be compared with prices of slaughter calves at the Chicago market.[3] There the average price of good and choice

[1] A large proportion of the milk cows in many areas of Kentucky have, in recent years, been bred to beef bulls. According to the Dairy Department, University of Kentucky, out of 413 herds in Fleming county in 1943 producing whole milk for a condensery, beef bulls were being used in 402 of these herds and dairy bulls in 11 herds.

[2] The "cow-and-calf plan" of beef production, from which "heavy fat calves" are marketed, has been increasing in Kentucky during the past decade. The cows used are usually of part dairy breeding, capable of 2 to 3 gallons of milk daily on pasture, and are bred to beef bulls, preferably purebred bulls of good type. The calf remains with the cow on pasture until it is marketed at 8 to 10 months of age, weighing 500 to 750 pounds. (See *Kentucky Cow-and-Calf Plan*, Ky. Agr. Col. Ext. Leaflet 95, 1945.) These "heavy fat calves." are usually of rather high quality. In market classification they neither fit with good-choice steers and heifers nor with good-choice slaughter calves. It is not yet possible to compare prices of these heavy fat calves with those of veal calves, because no price series for heavy fat calves is yet available.

[3] Chicago was used as the market for price comparison because of the completeness of the price series for both vealers and slaughter calves.

TABLE 9.— PRICES OF GOOD AND CHOICE VEAL CALVES AND SLAUGHTER CALVES, CHICAGO, 1931-43[a]

(Dollars per 100 pounds)

Year	Veal calves	Slaughter calves	Amount price of veal calves exceeded that for slaughter calves
1931	8.33	5.95	2.38
1932	6.21	4.72	1.49
1933	5.88	4.00	1.88
1934	6.10	5.06	1.04
1935	8.88	8.51	.37
1936	9.30	7.38	1.92
1937	10.07	8.37	1.70
1938	9.52	7.18	2.34
1939	10.07	7.94	2.13
1940	10.61	8.23	2.38
1941	12.18	9.31	2.87
1942	14.48	11.88	2.60
1943	15.18	12.65	2.53
1931-43 average	9.75	7.78	1.97

[a] Data from mimeo. annual summaries of livestock prices prepared by the Livestock, Meats, and Wool Division, Bur. Agr. Econ., U. S. Dept. Agr.

veal calves exceeded the average price of good and choice slaughter calves by $1.97 per 100 pounds for the 13-year period 1931-43 (Table 9). Prices for lower comparable grades of veal calves and slaughter calves are available only since 1940. The average price of common and medium grade veal calves exceeded the average price of the same grade of slaughter calves by $1.96 per 100 pounds, at Chicago, for the 4-year period 1940-43.

COMPETITIVE PRICE POSITION OF KENTUCKY VEAL CALVES

Livestock production in Kentucky is primarily a grass economy. As Kentucky as a whole is basically a feed-grain-deficit state, prices of feed grains in most years are higher in Kentucky than in the primary areas of grain production. Livestock enterprises most successful year after year in Kentucky are those that (1) require primarily grass, hay, or other roughage, or (2) make intensive use of labor and use for the most part feed derived from local agricultural production.

Geography of Prices of Veal Calves

Differences in prices for veal calves received by farmers in the various states (Fig. 18) are primarily due to the location of the producing area relative to the consuming area and differences in the quality of calves marketed. Veal calf prices in recent years were highest in New Jersey, Michigan, Delaware, Maryland, Pennsylvania, Ohio, Indiana, New York, Illinois, and Kentucky. These states are all in the northeastern quarter of the country and either have large cities themselves or are adjacent to other states with large cities. The southern states,

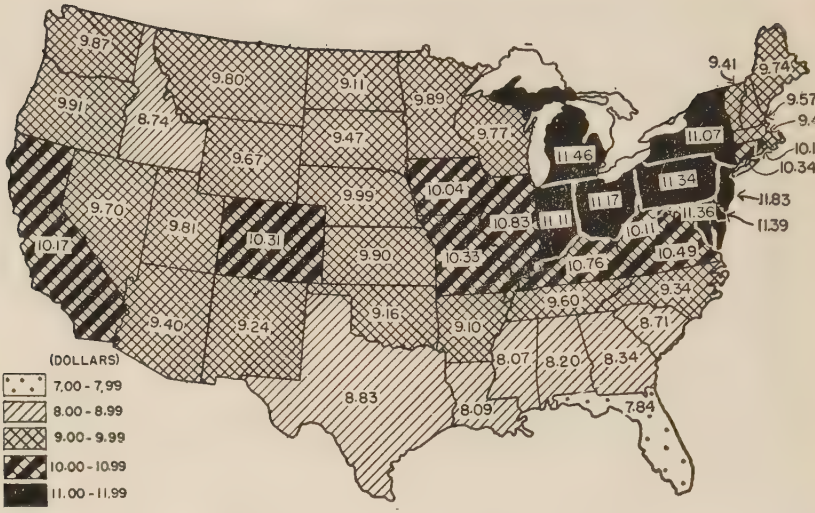

FIG. 18.— PRICES RECEIVED BY FARMERS FOR VEAL CALVES, BY STATES, AVERAGE OF ANNUAL PRICES, 1937-43

Prices are from the 15th of month price series as published by B.A.E., U.S.D.A.

the southwestern states, and the New England States[1] were low-price areas for veal calves. Quality was probably more of a factor in the lowness of prices in the southern states and in the New England States than in the extreme southwestern states. Distance to consuming markets for the surplus marketings probably is an important factor affecting prices in the southwestern states. Most of the remaining states were in the intermediate price classification.

Geography of Prices of Butterfat

The geographic pattern of prices received by farmers for butterfat differs in certain respects from that for veal calves. The New England States, Wisconsin, California, New Jersey, Utah, and Nevada were the states with the highest price for butterfat (Fig. 19). Prices in the other states in the northeast, in Minnesota and Iowa, and in the remaining states of the far west were also above average. The South is clearly the low price area for butterfat, and Kentucky readily falls into this price classification. A costly procurement system and low quality of butterfat probably are important factors causing a low farm price for butterfat in Kentucky. Small volume of production on farms, and the

[1] The low price for veal calves may be a function of the high price for milk in the New England States. As pointed out later, this is the area of highest price for butterfat. The average weight of calves marketed from this area is only slightly over 100 pounds and this light weight, within itself, could be responsible for a low price for veal calves.

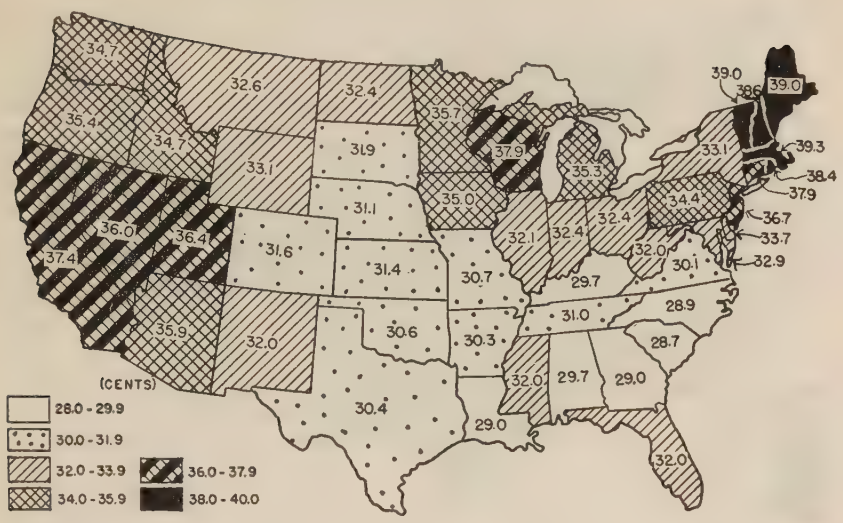

FIG. 19.— PRICES RECEIVED BY FARMERS FOR BUTTERFAT, BY STATES, AVERAGE OF ANNUAL PRICES, 1937-43

Prices are from the 15th of month price series as published by B.A.E., U.S.D.A.

lack of available water for cooling cream are not conducive to the production of high quality butterfat. The Great Plains States, too, are a relatively low price area, but not as low as the southern states.

Geographical Relationship of Prices of Veal Calves and Butterfat

The price of butterfat when converted to a milk-equivalent basis is normally lower than the price received for whole milk. Important marketings of veal calves are made by farmers who sell whole milk, but because of the higher value of milk sold whole than of milk from which butterfat only is sold, the production of veal is relatively less profitable for the farmers who sell whole milk than for those who sell butterfat.

The price of veal calves relative to the price of butterfat during 1937-43 was higher in Kentucky than in any other state (Fig. 20). Thus, those farmers in Kentucky who sold milk in the form of cream were at a greater comparative advantage in the production of veal calves than were farmers following the same type of enterprise in other states.[1] The growth of the veal calf enterprise in Kentucky and in-

[1] Comparison is for states as a whole. It is possible that farmers in some areas of other states may have an equal comparative advantage. The margin of the comparative advantage in Kentucky is so large, however, that it is unlikely that many areas, other than in the southeastern states, would have as great a comparative advantage.

FIG. 20.— POUNDS OF BUTTERFAT THAT WERE EQUAL IN VALUE TO HUNDRED-WEIGHT PRICE OF VEAL CALVES, BY STATES, AVERAGE OF 1937-43

Prices of butterfat and veal calves are from the 15th of month price series as published by B.A.E., U.S.D.A.

creased use of beef bulls in breeding dairy cows are understandable with prices of veal calves high in relation to prices of butterfat.[1]

Other states where prices of veal calves were highest in relation to the price of butterfat were Virginia, Indiana, Maryland, Ohio, Missouri, and Illinois. In many of the important dairy states, such as Wisconsin, Minnesota, and the New England States, prices for veal calves were relatively low in relation to butterfat prices. Veal calves were marketed at light weights in those states, reflecting higher returns from whole milk than from veal calves.

Changes in Prices of Veal Calves and Butterfat

Prices of veal calves in Kentucky and the United States

The price of veal calves in Kentucky rose relative to the average price of veal calves in the United States as a whole during 1910-43. Prior to 1926, the average farm price of veal calves in the United States as a whole exceeded that received by farmers in Kentucky. From 1926 to 1933, prices in Kentucky were either slightly higher than, or about the same as, those in the United States. After 1934 Kentucky prices exceeded average U. S. prices, in some years by more than $1 per 100 pounds. Changes in the freight rate structure from points in Kentucky to consuming centers for veal calves produced in the state do not explain the change in the price relationship. Possible explana-

[1] See footnote 1, page 40.

TABLE 10.—ANNUAL AVERAGE PRICES RECEIVED FOR BUTTERFAT BY PRODUCERS, UNITED STATES AND KENTUCKY, 1922-44[a]

(Cents per pound)

Year	United States	Kentucky	Amount United States price exceeded that of Kentucky
1922	35.9	34.3	1.6
1923	42.2	42.1	.1
1924	40.4	40.6	-.2
1925	42.4	41.6	.8
1926	41.6	39.9	1.7
1927	44.5	42.4	2.1
1928	46.1	44.6	1.5
1929	45.2	42.1	3.1
1930	34.5	32.1	2.4
1931	24.8	21.7	3.1
1932	17.9	15.2	2.7
1933	18.8	16.2	2.6
1934	22.7	20.4	2.3
1935	28.1	24.4	3.7
1936	32.2	29.3	2.9
1937	33.3	29.7	3.6
1938	26.3	22.3	4.0
1939	23.9	20.5	3.4
1940	28.1	24.5	3.6
1941	34.3	30.4	3.9
1942	39.8	35.8	4.0
1943	50.0	47.0	3.0
1944	50.3[b]	46.0[b]	4.3

[a] From *Farm Production and Income from Milk* and *Agricultural Prices*, B.A.E., U.S.D.A.
[b] Does not include dairy production payments.

tions are improvement in average quality of calves marketed and in marketing and pricing at the outlets for Kentucky veal calves.

Prices of butterfat in Kentucky and the United States

Farm prices for butterfat are available only since 1922. Except in 1924, the annual average price for butterfat in Kentucky from 1922 to 1943 was lower than the annual average U. S. price (Table 10). The difference of 3 to 4 cents per pound in recent years was greater than the differences during the 20's.

Relation of prices of veal calves to butterfat

A comparative price advantage occurred in the production of veal calves in Kentucky, as the Kentucky price of veal calves increased in relation to the average U. S. price, and as the Kentucky price of butterfat declined in relation to the average U. S. price. During the 1920's about the same number of pounds of butterfat were equivalent in value to the price per 100 pounds of veal calves both in Kentucky and the United States as a whole (Table 11). In the 1930's, however, it took up to 5.2 more pounds of butterfat in Kentucky than in the country as a whole to be equal to the price per 100 pounds of veal calves. This difference reached a peak in 1938 (8.9 pounds of butterfat), declined through 1942, and then dropped sharply in 1943.

TABLE 11.— POUNDS OF BUTTERFAT EQUIVALENT IN VALUE TO PRICE PER 100 POUNDS OF VEAL CALVES, UNITED STATES AND KENTUCKY, 1922-44

Year	United States	Kentucky	Amount by which equivalent in Kentucky exceeded that in United States
1922	21.4	20.7	-.7
1923	18.9	17.9	-1.0
1924	19.4	18.6	-.8
1925	20.3	20.2	-.1
1926	22.5	24.6	2.1
1927	22.8	24.7	1.9
1928	25.5	27.5	2.0
1929	26.9	29.8	2.9
1930	28.1	29.9	1.8
1931	28.0	32.1	4.1
1932	27.7	32.8	5.1
1933	24.7	28.7	4.0
1934	21.7	24.4	2.7
1935	25.6	31.4	5.8
1936	22.4	27.7	5.3
1937	24.3	30.9	6.6
1938	29.9	38.8	8.9
1939	35.2	43.3	8.1
1940	31.5	38.6	7.1
1941	30.2	36.6	6.4
1942	31.3	38.3	7.0
1943	27.0	30.9	3.9
1944	25.0	29.1	4.1

The relative price advantage of veal calves over butterfat evident in recent years in Kentucky is well illustrated by a comparison of the price relatives of the two products (Fig. 21). The price relative of veal calves from 1938-43 averaged 62 percent greater than that of butterfat, when using a base period of 1921-29.

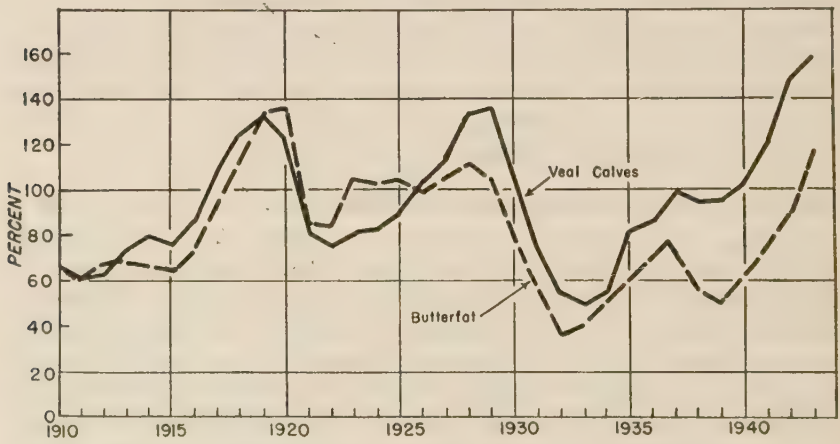

FIG. 21.— PRICE RELATIVES OF VEAL CALVES AND BUTTERFAT, KENTUCKY, 1910-43 (1921-29 = 100)

Data from Ky. Agr. Exp. Sta. Bul. 403, *Thirty Years of Farm Prices and Production in Kentucky*, pp. 231 and 249, and from Prices Received by Farmers Series as published in *Agricultural Prices*, U.S.D.A.

RELATION OF VALUE OF MILK UTILIZED BY VEAL CALVES TO VALUE OF VEAL CALVES, KENTUCKY

One of the most important factors in the profitableness or unprofitableness of producing veal calves in Kentucky is the birth weight of the calves, which in turn is primarily a function of the breed. A substantial proportion of the veal calves sold in Kentucky are of Jersey breeding and weigh from 50 to 55 pounds, on the average, at birth. Calves from heavier breeds of milk cows such as Holsteins, Brown Swiss, or Milking Shorthorns, on the other hand, range in average weight from 70 to 100 pounds at birth. If it is assumed that it takes 10 pounds of milk to produce one pound of veal, as is commonly used as an approximation by many writers on dairying, then a rough comparison can be made between the value of milk used in the production of veal calves and the value of the veal calves.

One further assumption is necessary in making this comparison, namely, that in feeding poultry and swine, 100 pounds of skimmilk is worth the value of approximately 11 pounds of corn combined with 7¼ pounds of tankage (or meat scraps).[1]

Alternative use of milk for veal calves or for sale as butterfat

The value of milk based upon butterfat prices and skimmilk value, used in raising a 55-pound calf to 185 pounds, under certain assumptions,[2] exceeded the market value of the 185-pound vealer in 17 of the 20 years, 1924-43 (Table 12). During the 14 years 1924-37 the value of the milk exceeded the value of calf from over $14 in 1924 to about $1 in 1932, the average annual difference being nearly $7 for the 14-year period. Since 1938, with the exception of 1943, the value of a 185-pound veal calf of a birth weight of 55 pounds was more nearly equal to the value of milk used. The trend during the 20-year period was towards a value of vealers more nearly in line with the value of the milk used in producing them.

Vealers that weighed 70 pounds at birth compared more favorably with the value of milk used in growing them to 185-pound market weights. While the value of milk used in production exceeded the value of the veal calf in all years except one from 1924 to 1937, the margin of difference was about $2.50 less than for the 55-pound calf at birth. From 1938 to 1943 the value of the 185-pound calf weighing 70 pounds at birth exceeded the value of milk used by about $2.50.

In 12 of the 20 years between 1924 and 1943, the value of a 185-pound calf with a birth weight of 90 pounds exceeded the value of milk utilized in veal production (Table 12). In only 3 years in the 15

[1] *Kentucky Farm Management Notes,* Ky. Agr. Exp. Sta., Farm Econ. Mimeo., March, 1942.

[2] For assumption see footnote to Table 12.

TABLE 12.—VALUE OF 185-POUND VEAL CALF AND VALUE OF MILK USED IN PRODUCTION, FOR CALVES OF DIFFERENT BIRTH WEIGHT, KENTUCKY, 1924-43

Year	Value of 185-pound veal calf[a]	Value of milk used to produce 185-pound veal calf of birth weight of —			Amount value of veal calf exceeded value of milk used by calves with birth weight of —		
		55 pounds[b]	70 pounds[c]	90 pounds[d]	55 pounds	70 pounds	90 pounds
1924	$13.57	$28.12	$24.87	$20.55	$—14.55	$—11.30	$— 6.98
1925	15.14	28.42	25.14	20.77	—13.28	—10.00	— 5.63
1926	17.63	26.13	23.12	19.10	— 8.45	— 5.44	— 1.42
1927	18.56	27.90	24.68	20.49	— 9.04	— 5.82	— 1.63
1928	22.10	31.01	27.43	22.76	— 8.91	— 5.33	— 0.66
1929	22.55	28.68	25.37	21.06	— 6.13	— 2.82	1.49
1930	17.28	22.31	19.73	16.40	— 5.03	— 2.45	0.88
1931	12.55	15.16	13.41	11.18	— 2.61	— 0.86	1.37
1932	8.96	10.07	8.92	7.47	— 1.11	0.04	1.49
1933	8.37	11.28	9.98	8.35	— 2.91	— 1.61	0.02
1934	8.96	14.69	12.99	10.83	— 5.73	— 4.03	— 1.87
1935	13.81	17.06	15.09	12.56	— 3.25	— 1.28	1.25
1936	14.60	20.11	17.79	14.80	— 5.51	— 3.19	— 0.20
1937	14.71	21.06	18.64	15.50	— 6.35	— 3.93	— 0.79
1938	15.57	15.03	13.30	11.08	0.54	2.27	4.49
1939	15.97	14.17	12.53	10.45	1.80	3.44	5.52
1940	17.03	17.49	15.46	12.87	— 0.46	1.57	4.16
1941	20.03	20.54	18.18	15.12	— 0.51	1.85	4.91
1942	24.61	24.54	21.72	18.04	0.07	2.89	6.57
1943	26.80	31.99	28.30	23.48	— 5.19	— 1.50	3.32

[a] Based upon 15th of month price series for Kentucky, B.A.E., U.S.D.A.

[b] Assuming that 10 pounds of milk is used for each pound of gain. Average butterfat test in Kentucky over the period was about 4.3 percent. This means that for a 55-pound calf at birth to reach a market weight of 185 pounds, 55.9 pounds of butterfat would be in the milk consumed. The value of this quantity of butterfat plus an additional allowance for the feed value of skimmilk is used as the value of milk. The feed value of 100 pounds of skimmilk is taken to be equal to the value of 10.6 pounds of cottonseed meal plus the value of 11 pounds of corn.

[c] Same as footnote 2 except that a 70-pound calf at birth would consume milk containing 49.4 pounds of butterfat.

[d] Same as footnote 2 except that a 90-pound calf at birth would consume milk containing 40.8 pounds of butterfat.

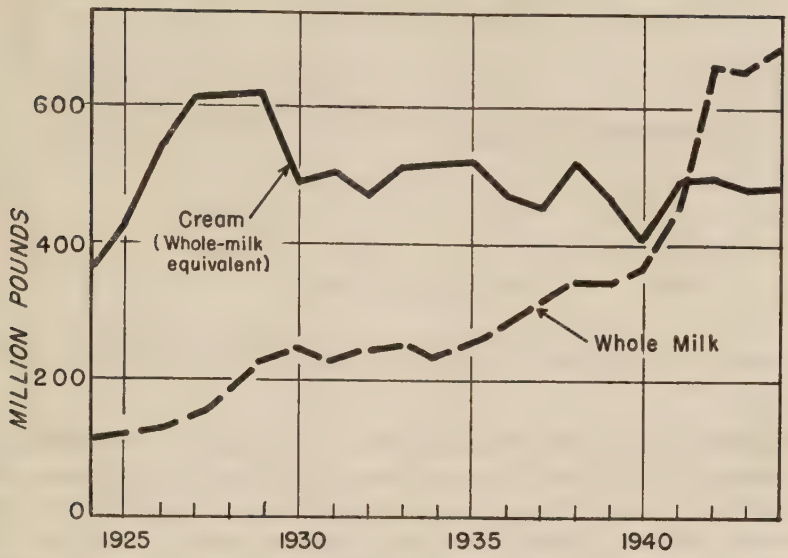

FIG. 22.— SALES OF WHOLE MILK AND CREAM (WHOLE MILK EQUIVALENT) FROM KENTUCKY FARMS, 1924-44

Data from *Farm Production, Disposition and Income from Milk* series, U.S.D.A.

years 1929-43 did the value of the milk used exceed the market value of the calf. During 1938-43, the average value of calf exceeded the value of the milk used by nearly $5. This change came about because of both an increase in the prices of veal calves in Kentucky, relative to the U. S. price, and a decrease in the price of butterfat in Kentucky, relative to the U. S. price.

Changes in disposition of milk, Kentucky

After the 1926-29 large marketings of milk as cream, the trend of cream sales in Kentucky was slightly downward (Fig. 22). The sales of whole milk, on an upward trend from 1924 to 1940, increased sharply with the impetus of wartime demands, until in 1942-44 the milk from farms sold as whole milk exceeded the milk equivalent of cream sales by nearly 200 million pounds annually.

The number of calves marketed from Kentucky farms also was on an upward trend from 1924 to 1944 (Fig. 23). Not only did the trend of marketings go up but the average weight of calves marketed also increased, by as much as 30 pounds per head from 1926 to 1943 at the four central Kentucky auction markets, the only markets for which weight data are available. The increase in production of veal calves likely was of more influence on cream sales than on whole-milk sales.

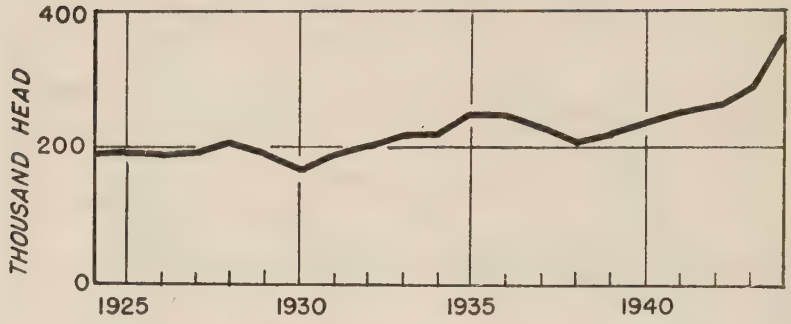

FIG. 23.— MARKETINGS OF CALVES FROM KENTUCKY FARMS, 1924-44
Data from *Farm Production and Income from Meat Animals* series, U.S.D.A.

Alternative use of milk for veal calves or for sale as whole milk

During 1938-43 the price for whole milk[1] in Kentucky averaged annually $2.06 per 100 pounds. The milk-equivalent value of the butterfat and the skimmilk for feed averaged annually $1.63 per 100 pounds for the same period. The value of a 185-pound veal calf of a birth weight of 90 pounds exceeded the value of butterfat and skimmilk utilized in production by $4.82, on the average, during 1938-43. If, however, the milk used in production of veal calves is valued at the price of whole milk, then the value of the calf exceeded the value of the milk by only $0.60. Valuing of milk used in the production of veal calves at fluid-milk prices increases the cost of producing veal calves.

Limitations and values of these comparisons

The foregoing comparisons of value of milk used in veal production with value of the calf are subject to several limitations. First, average prices of veal calves, butterfat, and milk used are for Kentucky as a whole. Second, the comparisons are for average quality of marketings. Third, production costs, other than the value of milk, are not included in the analysis. Difference in labor requirements for producing veal calves and for producing butterfat or whole milk are important cost items that should enter into a more detailed cost study.

Despite these limitations, however, this type of analysis emphasizes certain important facts. (1) Veal calves of heavier birth weights require a smaller total value of milk to reach top market weights, and hence the value of the calf when marketed is greater in relation to cost of the milk consumed than are calves of lighter birth weight. (2) The lower price of milk when sold as butterfat than when sold as whole milk makes the production of veal calves relatively more economical for farmers who sell butterfat than for those who sell whole milk.

[1] Includes milk sold to plants, dealers, and others, in whole form.

(3) The trend in Kentucky has been towards increased value of veal calves in relation to the value of milk utilized in their production.

It should be recognized that many Kentucky farmers produce calves of high quality and thus the price they receive is higher than that used in the foregoing comparisons. For example, good and choice veal calves at Louisville and calves in the top order buyer pens at the Four Auction Markets exceeded the annual average 15th-of-the-month prices during 1932-42 by $1.55 and $2.15 per 100 pounds respectively.[1]

SUMMARY

A commodity for market and consumption

Veal calves are produced throughout the United States, though mainly in the North Central and Northeastern sections where milk production is heaviest. Weight at which calves are marketed and the proportion of calves marketed in relation to numbers of cows on farms differ materially in different parts of the country. In general, veal calves are marketed at heavier weights in areas where prices of butterfat or whole milk are low in relation to prices of veal calves.

Veal calves are marketed through a system and organization developed to handle all kinds of livestock. Number of veal calves sold at the different types of market outlets varies greatly from state to state.

Veal comprises a relatively small proportion, generally between 4 and 6 percent, of the total meat consumed in the United States, but both per-capita and total consumption have increased somewhat in recent years. While some veal is consumed in small towns and by rural population, it is in the larger cities, particularly those with a large foreign-born population (especially French, German, Scandinavian, and Italian) or a large Jewish population, that the consumption of veal is greatest.

Trends in production and price

Production of veal in the United States from 1899 to 1944 was cyclically upward at the rate of about 15 million pounds increase annually, a slightly greater rate of increase than that of all meats combined. In relation to production of all meats, veal production increased at the rate of .07 percent annually from 1899 to 1940. The rising trend of veal production was primarily a result of changes in milk cow numbers.

Prices of veal calves during 1910-44, when deflated by the index of all agricultural prices, showed some evidence of an upward movement beginning about 1926.

[1] Not all of this difference was due to quality differences.

Cycles in production and price

Three cycles of production of veal have occurred since 1899—in 1899-1914, in 1914-29, and in 1929-40. These cycles, except that influenced by World War I, were similar to those of beef production.

A rather close inverse cyclical relationship occurred between the production of veal, with trend eliminated, and the deflated price of veal calves during 1910-44. A high degree of similarity occurred in the cycles of deflated prices of veal calves, milk cows, and beef cattle during this same period.

Competitive position of veal

Veal production was on an upward trend relative to the production of pork, beef, and chicken during 1910-43. Instead of a corresponding decline, however, in relation to prices of hogs, beef cattle, and chickens, prices of veal calves (1) increased relative to prices of hogs over the whole period; (2) increased relative to prices of chickens from 1921-43; and (3) declined relative to prices of beef cattle, but not at so great a rate as the increase in the production of veal relative to production of beef. Market demand for veal calves thus evidently increased relative to market demand for hogs, beef cattle, and chickens. Production of veal compared to that for lamb and mutton was smaller after 1928 than during 1917-27, and the relatively decreased production of veal was accompanied by correspondingly higher relative prices for veal calves than for sheep and lambs.

Factors affecting price

Investigation of factors affecting the price of veal calves was carried out by means of correlation analysis for the period 1921-41. Of the three independent variables used, nonagricultural income per capita was nearly twice as important in accounting for price changes of veal calves as were the combined effects of production of veal per capita and production of other meats per capita. The latter two independent variables were of about equal magnitude in accounting for price changes.

The analysis showed a high coefficient of correlation between the dependent and the three independent variables ($\overline{R}_{1.234} = .972$). The standard error of estimate of the dependent variable was 48 cents per 100 pounds.

Prices as related to quality differences

Annual prices of veal calves for the four terminal markets at Jersey City, Louisville, Cincinnati, and Chicago were compared by periods, 1932-34, 1935-40, and 1941-42. For good and choice veal calves, prices at Jersey City were higher than at Louisville, Cincinnati, and Chicago, in each of the three periods. Prices at Louisville increased

in the more recent years in relation to those at the other markets. Price spreads between grades were wider when prices were high than when they were low, and usually were greater at Jersey City than at the other three markets.

From 46 to 62 percent of the veal calves were sold in the top pen each year from 1937 through 1943 at four auction markets in Central Kentucky. The average annual weight of these top pens varied within the narrow limits of 185 to 192 pounds per calf during these years. The average price for calves sold in the top pens for the 7-year period was $0.90 higher than for calves in the 200-265 pound group and $1.49 higher than for calves in the second pens of the 165-200 pound group.

Competitive price position of Kentucky veal calves

The price of veal calves relative to the price of butterfat during 1937-43 was higher in Kentucky than in any other state. Thus, those farmers in Kentucky who sold milk in the form of cream were at a greater comparative advantage in the production of veal calves than were farmers following the same type of enterprise in other states.

Other states where prices of veal calves were highest in relation to the price of butterfat were Virginia, Indiana, Maryland, Ohio, Missouri, and Illinois. In many of the important dairy states, such as Wisconsin, Minnesota and the New England States, prices for veal calves were relatively low in relation to butterfat prices.

Value of milk utilized by veal calves in relation to value of veal calves, Kentucky

Analysis of this value relationship emphasized certain important facts: (1) Veal calves of heavier birth weights require a smaller total value of milk to reach top market weights, and hence the value of the calf when marketed is greater in relation to cost of the milk consumed than are calves of lighter birth weight. (2) The lower price of milk when sold as butterfat than when sold as whole milk makes the production of veal calves relatively more economical for farmers who sell butterfat than for those who sell whole milk. (3) The trend in Kentucky has been toward increased value of veal calves in relation to the value of milk utilized in their production.

APPENDIX

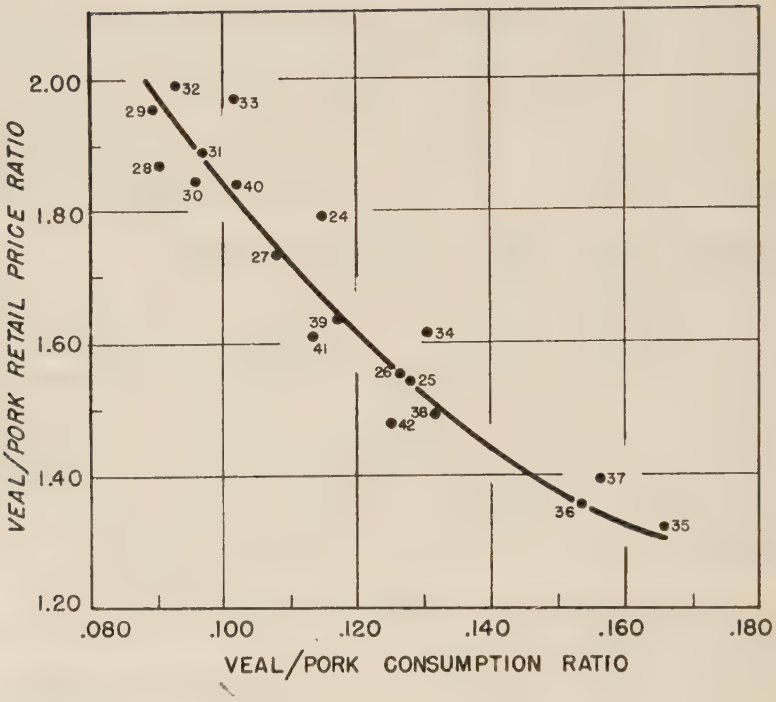

FIG. 24.— RELATIONS BETWEEN PRICE AND CONSUMPTION RATIOS FOR VEAL AND PORK, UNITED STATES, 1924-42

A rather definite relationship occurred between the price and consumption ratios for veal and pork during 1924-42. Retail prices used were those for New York City (Table 13, page 58), an adequate composite retail price series for veal not being available for the United States as a whole. Consumption data (Table 15, page 59) were for the United States. The degree of relationship between the price and consumption ratios was high, the index of correlation being —.89.

The line of average relationship (free hand) or the demand interrelation curve between the price and consumption ratios of veal and pork showed evidence of being curvilinear. The elasticity of the curve varied from —1.6 at the upper end to about —1.4 at the midpoint, then increased to —2.5 at the lower end under influence primarily of the three years 1935-37. Such elasticity indicates that, roughly, a 1-percent change in the price ratios during this period was accompanied by about a 1½-percent change in the consumption ratio.

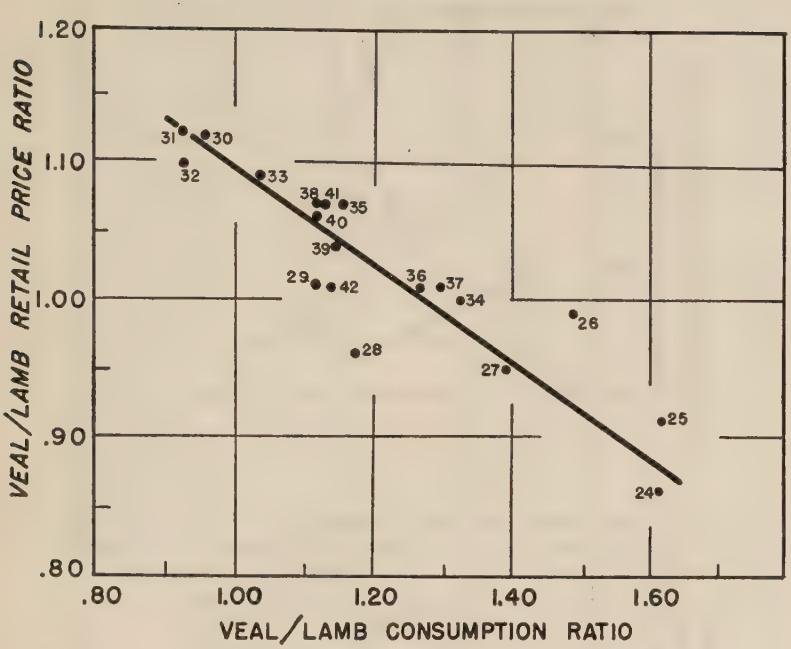

FIG. 25.— RELATION BETWEEN PRICE AND CONSUMPTION RATIOS FOR VEAL AND LAMB, UNITED STATES, 1924-42

A rather close relationship existed between the ratios of veal and lamb prices and the ratios of veal and lamb consumption ($\bar{r}$=—.92) during 1924-42. This curve of relationship was quite elastic, varying from —3.2 at the upper end to —2.2 at the midpoint, and to —1.7 at the lower end. Small changes in the price of veal relative to price of lamb accompanied important changes in the consumption of veal relative to consumption of lamb.

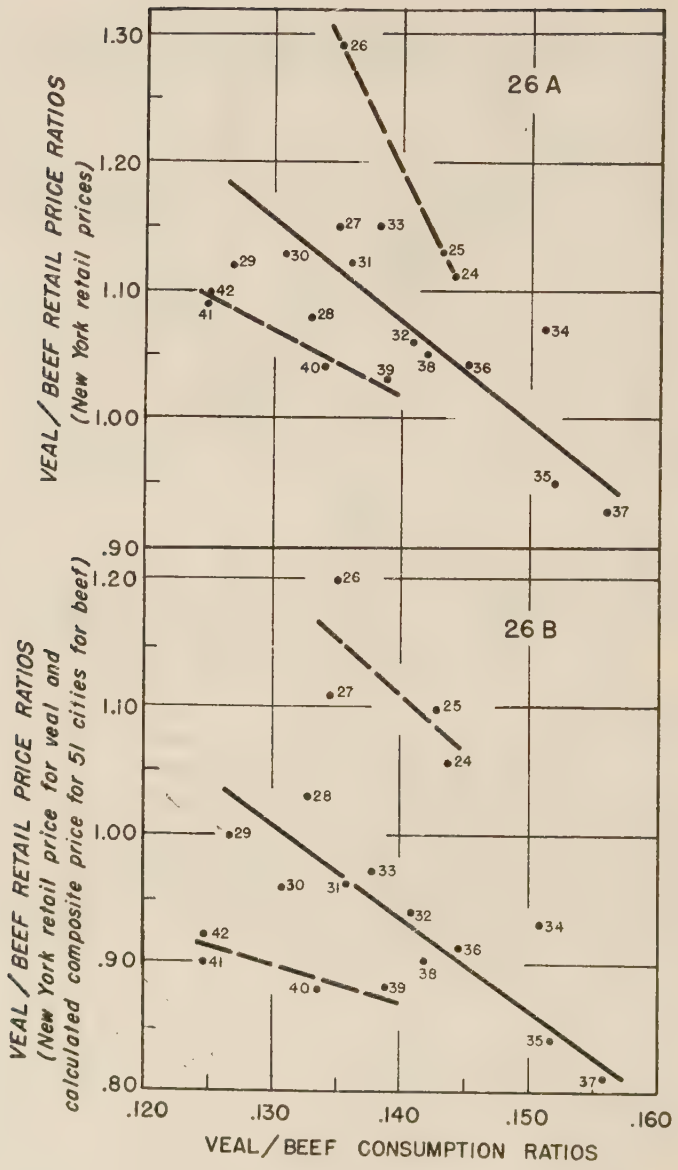

FIG. 26.—RELATION BETWEEN PRICE AND CONSUMPTION RATIOS OF VEAL AND BEEF, UNITED STATES, 1924-42

There was some evidence of shifts in the demand interrelation curve between veal and beef, yet the lines of relationship were not sufficiently stable to permit other than general observations. Casual consideration of section A of the above chart leaves in doubt the slope of a line of relationship, for if the divergent years of 1926, 1935, and 1937 were omitted in the period 1928-42, the line of relationship

(Legend continued on following page.)

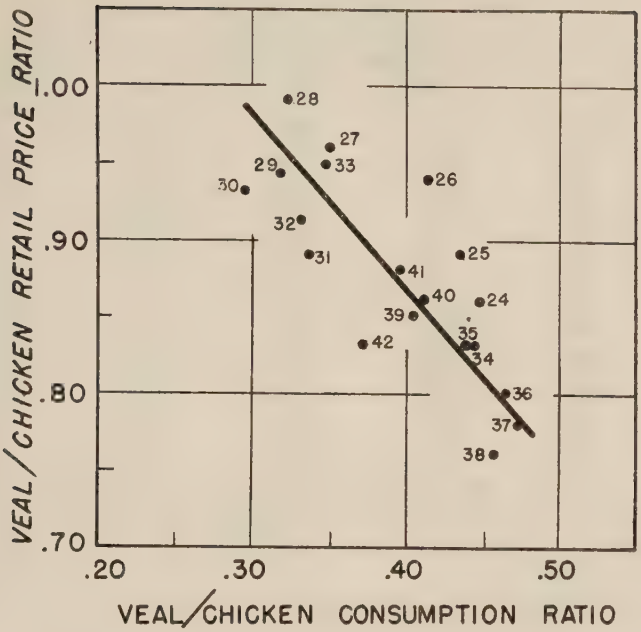

FIG. 27.— RELATION BETWEEN PRICE AND CONSUMPTION RATIOS OF VEAL AND CHICKEN, UNITED STATES, 1924-42

Some evidence of relationship ($\bar{r}$=—.57) existed between the price ratios of veal and chicken for the 1924-42 period. The peculiar bunching of the years, however, reduces the significance of the relationship. The price-consumption line of average relationship (free hand) between veal and chicken varied in elasticity from —3.4 at the upper end, to —2.1 at the midpoint, and to —1.6 at the lower end. This elasticity was similar to that for the veal-lamb line of relationship.

(Legend for Fig. 26, continued)

fitted to the remaining years would be of high elasticity. Closer consideration of this figure indicates that if the period were broken down into 1924-26, 1927-38, and 1939-42 the linear lines of relationship fitted to each of these series of years would be of a somewhat similar slope. In section B, when the calculated price of beef for the 51 cities is used in place of the New York price of beef, the possible shifts in the curves are somewhat more evident.

The reasons for these shifts, if they are true shifts in the demand interrelationships, have not been determined. Attention is called to the elasticities of —1.0 at the midpoint of the 1927-38 line of section A and —0.9 at the midpoint of the 1928-38 line of section B.

TABLE 13.—RETAIL PRICE SERIES FOR VEAL, BEEF, LAMB, AND PORK, NEW YORK BASIS, 1924-42

Year	Retail prices, New York basis, per hundredweight for meats				Retail price per pound for roasting chickens, 51 cities[c]
	Veal[a]	Beef[b]	Lamb[b]	Pork[b]	
					cents
1924	$31.35	$28.26	$36.33	$17.51	36.4
1925	33.89	29.87	37.12	22.04	38.0
1926	37.72	29.31	38.24	24.30	40.2
1927	36.60	31.72	38.73	21.11	38.2
1928	38.33	35.58	39.89	20.50	38.9
1929	38.78	34.78	38.57	19.93	41.2
1930	34.30	30.34	30.73	18.69	36.7
1931	28.58	25.43	25.61	15.16	32.2
1932	23.32	21.96	21.21	11.74	25.6
1933	20.76	18.08	19.03	10.55	21.8
1934	21.40	20.01	21.49	13.32	25.9
1935	25.65	27.10	23.96	19.65	30.9
1936	25.91	24.87	25.64	19.16	32.5
1937	26.55	28.59	26.39	19.11	34.1
1938	26.04	24.80	24.44	17.51	34.2
1939	26.00	25.27	25.02	15.98	30.6
1940	26.16[d]	25.22[e]	24.60[f]	14.28	30.4
1941	28.53[d]	26.27[e]	26.56[f]	17.71	32.6
1942	32.57[d]	29.53[e]	32.27[f]	22.08	39.1

[a] Derived by weighting retail prices of veal cutlets by 20, of veal rib by 9, and of veal breast by 7, and "from the average relation of these prices to the weighted prices of all veal cuts per hundredweight of carcass, as determined from data in the records of Armour & Company." Quoted statement is from *Armour's Livestock Bureau, Monthly Letter to Animal Husbandmen*, Oct.-Dec., 1937, p. 2. Retail prices for veal cuts are those of the Bureau of Agricultural Economics.

[b] The retail values of products for each kind of meat from 100 pounds live-weight, as calculated by the Bureau of Agricultural Economics, were converted to a carcass basis by dividing by the dressing percentage each year of each kind of livestock.

[c] From Division of Statistical and Historical Research, Bur. Agr. Econ., U. S. Dept. Agr. (compiled from retail prices as published by the U. S. Bureau of Labor Statistics.)

[d] Change in July 1940 in the method of collecting and compiling retail prices necessitated adjustments in last half of 1940 and following years. As there was practically no change in the price of good grade veal carcass at New York from the first 6 months of 1940 to last 6 months of 1940, the changes in each of the retail veal cuts as shown in the price series between the first and last half of 1940, were used as the basis of adjustment in the last half of 1940, 1941, and 1942.

[e] Adjustment in series from the last half of 1940 on, due to changes in collection and compilation of retail prices in July 1940, was based upon the change in a calculated series of beef prices for the 51 cities from the first to the last half of 1940. Only a slight adjustment occurred.

[f] Same procedure of adjustment as for veal as explained in footnote d.

TABLE 14.—CALCULATED COMPOSITE RETAIL PRICE SERIES FOR BEEF, 51 CITIES, 1924-42

Year	Composite price per 100 pounds[a]	Year	Composite price per 100 pounds[a]
1924	$29.50	1934	$23.10
1925	30.80	1935	30.40
1926	31.50	1936	28.60
1927	32.90	1937	32.60
1928	37.20	1938	29.00
1929	38.90	1939	29.60
1930	35.90	1940	29.70
1931	29.90	1941	31.80
1932	24.70	1942	35.40
1933	21.30		

[a] Retail prices those of the Bureau of Agricultural Economics. Weights 5.3 used for round steak, 7.6 for rib roast, and 5.3 for chuck roast. Weights based upon food consumption of 14,469 families in 42 cities, 1934-36 as shown in *Money Disbursements of Wage Earners and Clerical Workers, 1934-36, Summary Volume*, by Faith M. Williams and Alice C. Hanson, U. S. Bur. Labor Statis. Bul. 638, 1941.

TABLE 15.— PER-CAPITA CONSUMPTION OF VEAL, LAMB (AND MUTTON), PORK, BEEF, AND CHICKEN, UNITED STATES, 1924-42

(Pounds per capita)

Year	Veal[a]	Lamb and mutton[a]	Pork[a]	Beef[a]	Chicken[b]
1924	8.6	5.3	74.7	59.9	19.2
1925	8.6	5.3	67.3	60.0	19.8
1926	8.2	5.5	64.6	60.7	19.7
1927	7.4	5.3	68.2	54.9	21.0
1928	6.5	5.5	71.3	49.0	20.2
1929	6.3	5.6	69.8	49.8	19.8
1930	6.4	6.7	67.0	48.9	21.6
1931	6.6	7.1	68.3	48.5	19.5
1932	6.6	7.1	70.6	46.7	19.8
1933	7.1	6.8	69.9	51.4	20.4
1934	8.4	6.3	64.2	55.8	18.9
1935	8.0	6.9	48.3	52.8	18.2
1936	8.4	6.6	55.0	57.9	18.2
1937	8.6	6.6	55.6	55.0	18.1
1938	7.7	6.9	58.2	54.4	16.9
1939	7.6	6.6	64.7	54.7	18.7
1940	7.4	6.6	72.9	55.1	18.1
1941	7.7	6.9	67.7	61.6	19.5
1942	8.2	7.2	65.3	65.8	21.9

[a] From *Livestock, Meats and Wool Market Statistics and Related Data, 1942*, U.S.D.A., p. 94 (June 1943).

[b] From *1944 Agricultural Outlook Charts*, U.S.D.A., p. 83 (October 1943).

TABLE 16.— DATA USED IN CORRELATION ANALYSIS OF FACTORS AFFECTING PRICES OF VEAL CALVES, U. S., 1921-41

Year	Price of veal calves[a] (dollars per 100 pounds)	Nonagricultural income per capita[b] (1935—39=100)	Per-capita production of veal[c] (1935—39=100)	Per-capita production of other material other meats[d] (pounds)
	X_1	X_2	X_3	X_4
1921	7.85	106.5	93.9	150.3
1922	7.64	108.3	96.3	157.7
1923	7.90	120.3	101.7	169.4
1924	7.83	121.7	106.0	165.2
1925	8.59	121.6	106.2	154.5
1926	9.34	129.1	101.1	153.6
1927	10.14	128.2	90.5	150.6
1928	11.75	129.0	79.7	148.5
1929	12.16	131.4	77.7	146.4
1930	9.68	116.9	80.0	144.3
1931	6.95	99.9	82.5	145.6
1932	4.95	77.2	81.8	144.6
1933	4.64	73.6	88.3	151.3
1934	4.92	83.1	104.9	147.6
1935	7.16	88.8	99.4	123.0
1936	7.20	102.7	104.4	141.2
1937	8.10	107.2	107.0	130.9
1938	7.90	97.8	95.3	136.4
1939	8.40	103.5	94.2	145.1
1940	8.86	111.8	92.2	154.9
1941	10.35	130.8	96.0	158.4

[a] Prices received by farmers (15th of month series), from *Livestock, Meats and Wool Market Statistics and Related Data, 1943*, U.S.D.A., p. 68.

[b] Index of nonagricultural income payments, as published in *Livestock, Meats and Wool Market Statistics and Related Data, 1942*, U.S.D.A., p. 77, divided annually by non-farm population on Jan. 1, as published in *Population Estimates*, 1900-1943, U.S.D.A. (mimeo. Dec. 1943), converted to an index basis.

[c] Production of veal, as published in *Livestock, Meats and Wool Market Statistics, 1942*, p. 94, converted to a per-capita basis.

[d] Includes production of beef, pork, lamb (and mutton) and chicken. Production of each meat, other than chicken, from *Livestock, Meats and Wool Market Statistics, 1942*, U.S.D.A., p. 94. Production of chicken from *1944 Outlook Charts*, U.S.D.A., p. 83.

TABLE 13.—RETAIL PRICE SERIES FOR VEAL, BEEF, LAMB, AND PORK, NEW YORK BASIS, 1924-42

Year	Retail prices, New York basis, per hundredweight for meats				Retail price per pound for roasting chickens, 51 cities[c]
	Veal[a]	Beef[b]	Lamb[b]	Pork[b]	
					cents
1924	$31.35	$28.26	$36.33	$17.51	36.4
1925	33.89	29.87	37.12	22.04	38.0
1926	37.72	29.31	38.24	24.30	40.2
1927	36.60	31.72	38.73	21.11	38.2
1928	38.33	35.58	39.89	20.50	38.9
1929	38.78	34.78	38.57	19.93	41.2
1930	34.30	30.34	30.73	18.69	36.7
1931	28.58	25.43	25.61	15.16	32.2
1932	23.32	21.96	21.21	11.74	25.6
1933	20.76	18.08	19.03	10.55	21.8
1934	21.40	20.01	21.49	13.32	25.9
1935	25.65	27.10	23.96	19.65	30.9
1936	25.91	24.87	25.64	19.16	32.5
1937	26.55	28.59	26.39	19.11	34.1
1938	26.04	24.80	24.44	17.51	34.2
1939	26.00	25.27	25.02	15.98	30.6
1940	26.16[d]	25.22[e]	24.60[f]	14.28	30.4
1941	28.53[d]	26.27[e]	26.56[f]	17.71	32.6
1942	32.57[d]	29.53[e]	32.27[f]	22.08	39.1

[a] Derived by weighting retail prices of veal cutlets by 20, of veal rib by 9, and of veal breast by 7, and "from the average relation of these prices to the weighted prices of all veal cuts per hundredweight of carcass, as determined from data in the records of Armour & Company." Quoted statement is from *Armour's Livestock Bureau, Monthly Letter to Animal Husbandmen*, Oct.-Dec., 1937, p. 2. Retail prices for veal cuts are those of the Bureau of Agricultural Economics.

[b] The retail values of products for each kind of meat from 100 pounds live-weight, as calculated by the Bureau of Agricultural Economics, were converted to a carcass basis by dividing by the dressing percentage each year of each kind of livestock.

[c] From Division of Statistical and Historical Research, Bur. Agr. Econ., U. S. Dept. Agr. (compiled from retail prices as published by the U. S. Bureau of Labor Statistics.)

[d] Change in July 1940 in the method of collecting and compiling retail prices necessitated adjustments in last half of 1940 and following years. As there was practically no change in the price of good grade veal carcass at New York from the first 6 months of 1940 to last 6 months of 1940, the changes in each of the retail veal cuts as shown in the price series between the first and last half of 1940, were used as the basis of adjustment in the last half of 1940, 1941, and 1942.

[e] Adjustment in series from the last half of 1940 on, due to changes in collection and compilation of retail prices in July 1940, was based upon the change in a calculated series of beef prices for the 51 cities from the first to the last half of 1940. Only a slight adjustment occurred.

[f] Same procedure of adjustment as for veal as explained in footnote d.

TABLE 14.—CALCULATED COMPOSITE RETAIL PRICE SERIES FOR BEEF, 51 CITIES, 1924-42

Year	Composite price per 100 pounds[a]	Year	Composite price per 100 pounds[a]
1924	$29.50	1934	$23.10
1925	30.80	1935	30.40
1926	31.50	1936	28.60
1927	32.90	1937	32.60
1928	37.20	1938	29.00
1929	38.90	1939	29.60
1930	35.90	1940	29.70
1931	29.90	1941	31.80
1932	24.70	1942	35.40
1933	21.30		

[a] Retail prices those of the Bureau of Agricultural Economics. Weights 5.3 used for round steak, 7.6 for rib roast, and 5.3 for chuck roast. Weights based upon food consumption of 14,469 families in 42 cities, 1934-36 as shown in *Money Disbursements of Wage Earners and Clerical Workers, 1934-36, Summary Volume*, by Faith M. Williams and Alice C. Hanson, U. S. Bur. Labor Statis. Bul. 638, 1941.

TABLE 15.— PER-CAPITA CONSUMPTION OF VEAL, LAMB (AND MUTTON), PORK, BEEF, AND CHICKEN, UNITED STATES, 1924-42

(Pounds per capita)

Year	Veal[a]	Lamb and mutton[a]	Pork[a]	Beef[a]	Chicken[b]
1924	8.6	5.3	74.7	59.9	19.2
1925	8.6	5.3	67.3	60.0	19.8
1926	8.2	5.5	64.6	60.7	19.7
1927	7.4	5.3	68.2	54.9	21.0
1928	6.5	5.5	71.3	49.0	20.2
1929	6.3	5.6	69.8	49.8	19.8
1930	6.4	6.7	67.0	48.9	21.6
1931	6.6	7.1	68.3	48.5	19.5
1932	6.6	7.1	70.6	46.7	19.8
1933	7.1	6.8	69.9	51.4	20.4
1934	8.4	6.3	64.2	55.8	18.9
1935	8.0	6.9	48.3	52.8	18.2
1936	8.4	6.6	55.0	57.9	18.2
1937	8.6	6.6	55.6	55.0	18.1
1938	7.7	6.9	58.2	54.4	16.9
1939	7.6	6.6	64.7	54.7	18.7
1940	7.4	6.6	72.9	55.1	18.1
1941	7.7	6.9	67.7	61.6	19.5
1942	8.2	7.2	65.3	65.8	21.9

[a] From *Livestock, Meats and Wool Market Statistics and Related Data, 1942*, U.S.D.A., p. 94 (June 1943).

[b] From *1944 Agricultural Outlook Charts*, U.S.D.A., p. 83 (October 1943).

TABLE 16.— DATA USED IN CORRELATION ANALYSIS OF FACTORS AFFECTING PRICES OF VEAL CALVES, U. S., 1921-41

Year	Price of veal calves[a] (dollars per 100 pounds)	Nonagricultural income per capita[b] (1935—39=100)	Per-capita production of veal[c] (1935—39=100)	Per-capita production of other material other meats[d] (pounds)
	X_1	X_2	X_3	X_4
1921	7.85	106.5	93.9	150.3
1922	7.64	108.3	96.3	157.7
1923	7.90	120.3	101.7	169.4
1924	7.83	121.7	106.0	165.2
1925	8.59	121.6	106.2	154.5
1926	9.34	129.1	101.1	153.6
1927	10.14	128.2	90.5	150.6
1928	11.75	129.0	79.7	148.5
1929	12.16	131.4	77.7	146.4
1930	9.68	116.9	80.0	144.3
1931	6.95	99.9	82.5	145.6
1932	4.95	77.2	81.8	144.6
1933	4.64	73.6	88.3	151.3
1934	4.92	83.1	104.9	147.6
1935	7.16	88.8	99.4	123.0
1936	7.20	102.7	104.4	141.2
1937	8.10	107.2	107.0	130.9
1938	7.90	97.8	95.3	136.4
1939	8.40	103.5	94.2	145.1
1940	8.86	111.8	92.2	154.9
1941	10.35	130.8	96.0	158.4

[a] Prices received by farmers (15th of month series), from *Livestock, Meats and Wool Market Statistics and Related Data, 1943*, U.S.D.A., p. 68.

[b] Index of nonagricultural income payments, as published in *Livestock, Meats and Wool Market Statistics and Related Data, 1942*, U.S.D.A., p. 77, divided annually by non-farm population on Jan. 1, as published in *Population Estimates*, 1900-1943, U.S.D.A. (mimeo. Dec. 1943), converted to an index basis.

[c] Production of veal, as published in *Livestock, Meats and Wool Market Statistics, 1942*, p. 94, converted to a per-capita basis.

[d] Includes production of beef, pork, lamb (and mutton) and chicken. Production of each meat, other than chicken, from *Livestock, Meats and Wool Market Statistics, 1942*, U.S.D.A., p. 94. Production of chicken from *1944 Outlook Charts*, U.S.D.A., p. 83.

3500—4-46

Bulletin 490 June, 1946

Seasonal Variation in Prices of Veal Calves

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SUMMARY 33

Seasonal Variation in Prices of Veal Calves

By A. J. Brown[1]

RELATIVELY LITTLE CONSIDERATION in economic research has been given to the study of seasonal variation in prices of veal calves. The scarcity of such studies likely has been due to the minor role veal calves play in the whole dairy enterprise. Other factors form the basis of when cows are to freshen—the calf is disposed of soon after birth, and the milk production enterprise continues. Particularly in areas where milk is high in price, and in the commercial-milk areas, veal calves as a separate economic commodity receive little consideration by farmers. But there are areas in Kentucky and in other states where the raising of veal calves to market weights of 175 to 200 pounds is one of the planned enterprises of the farm. Farmers choose to market part of the milk in the form of veal calves. This being the case, the seasonal aspects of prices of veal calves, the seasonal relationships between prices of veal calves and of butterfat, and the factors responsible for the seasonal changes, are subjects for consideration.

Dairy Production Enterprises of Kentucky

Kentucky farms on which cows are milked readily fall into three classifications: the family-cow farms with 1 or 2 cows per farm, the small-herd farms with 3 to 9 cows per farm, and the commercial-herd farms with 10 or more cows per farm. In 1939, 71.5 percent of the farms upon which cows and heifers were milked were family-cow farms as thus classified, 26.0 percent were small-herd farms, and only 2.5 percent were commercial-herd farms (Table 1). Only 39 percent of all the cows, however, were on the family-cow farms; 45 percent were on the small-herd farms, and 16 percent on the commercial-herd farms.

On most commercial-herd farms, veal calves receive relatively little attention. Milk production is the main enterprise; calves not kept for herd replacement are sold or killed usually within a week after birth.

It is on the family-cow farm and the small-herd farm that the marketings of veal calves receive more attention, particularly as to the weight of calves when marketed. On these farms, first con-

[1] The author wishes to acknowledge the helpful suggestions of Dana G. Card in developing this subject.

TABLE 1.—NUMBER OF FARMS REPORTING COWS MILKED, NUMBER OF COWS MILKED, AND DAIRY PRODUCTS SOLD, BY SIZE OF COW HERDS, 1939[a]

	1-2 cows	3-9 cows	10 cows or more	Total
Number of farms reporting	146,489	53,247	5,214	204,950
Percent of farms reporting	71.5	26.0	2.5	100.0
Number of cows on farms reporting	200,378	231,451	82,836	514,665
Percent of cows on farms reporting	38.9	45.0	16.1	100.0
Number of farms reporting dairy products sold				
Whole milk	6,513	11,139	3,714	21,366
Cream	26,603	30,186	1,645	58,434
Butter	8,741	4,026	324	13,091

[a] From 1940 Census of Agriculture, *Special Report on Cows Milked and Dairy Products*, Bureau of Census, U. S. Dept. of Commerce, p. 232.

sideration probably is given to the home milk supply. Less than 7 thousand of the 146 thousand family-cow farms reported the sale of whole milk in 1939, about 27 thousand the sale of cream, and 9 thousand the sale of butter. If there were no duplication in farms reporting products sold, this would mean that about 71 percent of these family-cow farms sold no dairy products.

Sales of dairy products from the small-herd farms in Kentucky are proportionally greater than from the family-cow farms. Of the 53 thousand small-herd farms in 1939, 11 thousand reported the sale of whole milk, 30 thousand the sale of butterfat, and 4 thousand the sale of farm butter. It is from this group, in particular, that the sale of cream is large, for from these small herd farms was sold 67 percent of all the cream sold from Kentucky farms in 1939. Veal calves offer an alternative market outlet for milk; and when the price of veal calves is high in relation to price of butterfat, the economic incentive for farmers on these small-herd farms to produce veal calves instead of butterfat is strengthened.

Many farmers in Kentucky market a part of the farm's milk production in the form of veal calves. In 1943, about 300 million pounds of milk were used in the production of veal calves in Kentucky,[1] compared to 21 million pounds of milk sold in the form of farm butter, 491 million pounds sold in the form of cream, 655 million pounds sold as whole milk to processors or distibutors, and

[1] This estimate for Kentucky in 1943 was arrived at as follows: with such a large proportion of the total milk cows of Jersey breeding, it is likely that the average birthweight of calves is low—say 65 pounds. The average weight at which calves were marketed, according to the United States Department of Agriculture, was 170 pounds. If it is assumed that 10 pounds of milk is used in the production of one pound of veal, then 1,050 pounds of milk would be used on the average, in raising a 65-pound calf to market weight as a vealer of 170 pounds. With 287,000 calves being sold in Kentucky in 1943 this would mean about 300 million pounds of milk were used in the production of veal calves.

145 million pounds sold at retail by farmers as milk or cream.[1] Veal calves thus are used to an important extent as an alternative market outlet for milk.

Pattern of Prices of Veal Calves at Various Markets

At Markets Serving Kentucky[2]

Prices of high quality veal calves were seasonally highest during January and February with prices 9 to 15 percent above the season's average, during 1932-42, depending upon which of the markets, Jersey City, Louisville, Cincinnati, or four central Kentucky auction markets,[3] is considered (Fig. 1). During March, April, and May, prices for high-quality calves declined seasonally, reaching the seasonal low in June when prices were 9 to 15 percent below the season's average at the different markets. Prices usually rose at the markets from June to September or October. At Louisville, Jersey City, and the four central Kentucky auction markets, prices ranged from 1 to 7 percent above the season's average during September, October, November, and December, depending upon the month and market considered. Prices at all markets rose sharply from December to January. Prices at Louisville ranged from 115 percent of the season's average in January to 85 percent in June. At Cincinnati the range was about the same, and at Jersey City and the four auctions it was somewhat smaller.

Prices of good and choice veal calves at Louisville (and also for high-quality calves at the other markets shown in Fig. 1) followed the same general seasonal pattern in most years during 1932-42 (Fig. 2). Sharp changes in the level of prices and abrupt short-time changes in receipts in some years caused considerable variation from the average for the 11-year period. As a whole, the trend of prices of veal calves was upward during these eleven years.[4] For medium grade veal calves the seasonal price pattern was quite similar to that for good and choice veal calves at Louisville during 1932-42 (Fig. 3).

[1] Sales of milk in different forms from *Farm Production, Disposition and Income from Milk*, 1943-44, U. S. Dept. of Agr., April, 1946.

[2] For a discussion of the market movement of veal calves, including the quantitative importance of markets used by Kentucky farmers in selling veal calves, see *Market Movement of Livestock in Kentucky*, by A. J. Brown and C. D. Phillips, Ky. Agr. Exp. Sta. Bul. 446, 1943.

[3] Located at Danville, Lexington, Paris, and Winchester.

[4] The median-link-relative method used for calculating seasonal variation adjusts for trend, and hence the seasonal price patterns calculated by this method were corrected for trend.

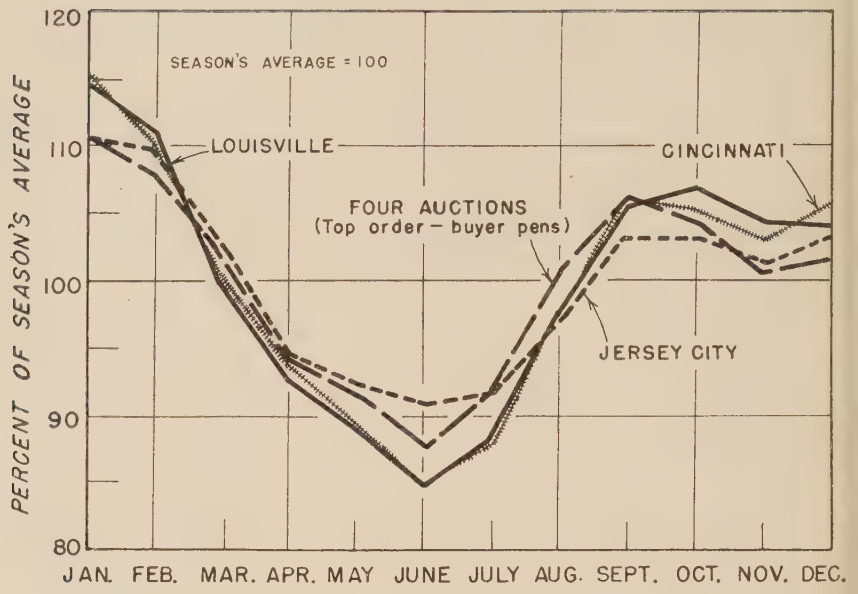

FIG. 1.— SEASONAL VARIATION IN PRICES OF GOOD AND CHOICE VEAL CALVES AT LOUISVILLE, JERSEY CITY, AND CINCINNATI, AND TOP-ORDER-BUYER-PEN CALVES AT FOUR CENTRAL KENTUCKY AUCTION MARKETS, 1932-42.

Calculated by median-link-relative method. Data for Louisville, Jersey City, and Cincinnati were from annual mimeographed livestock price reports, U. S. Dept. Agr., and for the four auctions from Ky. Agr. Exp. Sta. Bul. 459, April 1944, p. 12. The four central Kentucky livestock auction markets were at Danville, Lexington, Paris, and Winchester.

Prices of medium grade veal calves were slightly higher in September and October and somewhat lower in December than were prices of good and choice grades.

Some indication of the stability of the seasonal price pattern for veal calves can be had by study of the frequency with which prices changed in the same direction from one month to the next during the 11-year period. Taking Louisville prices as an example, April prices were lower than March prices 10 of the 11 years, while prices increased from July to August to September in 10 of the 11 years, and from December to January in all 11 years (Table 2). From May to June, June to July, and October to November, however, the price moved in the same direction in only 7 of the 11 years; from September to October, in 7 of 10 years (one year the price was the same in both months); and from November to December, in 5 of 9 years (in 2 years the price was the same in both months).

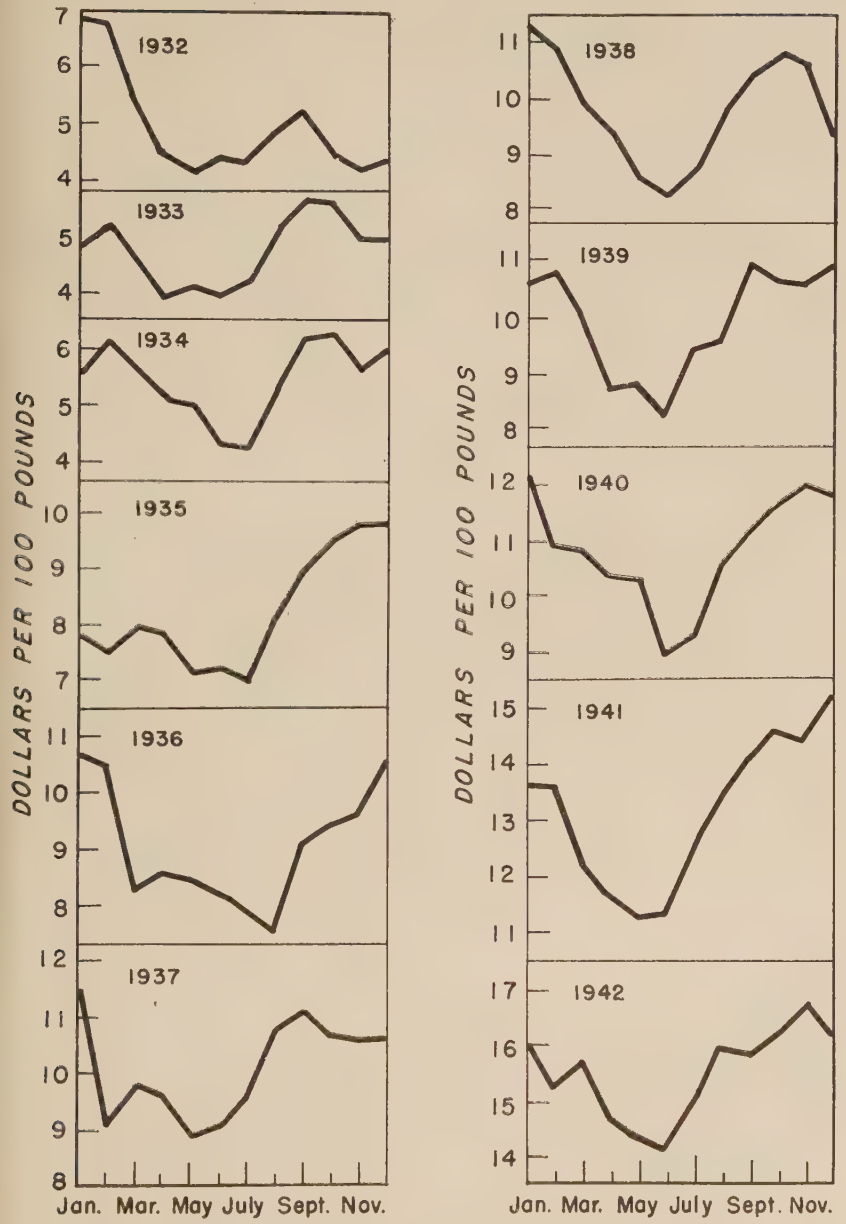

FIG. 2.— PRICES OF GOOD AND CHOICE VEAL CALVES, LOUISVILLE, BY MONTHS, 1932-42

Data from annual mimeographed livestock price reports for Louisville, U. S. Dept. Agr.

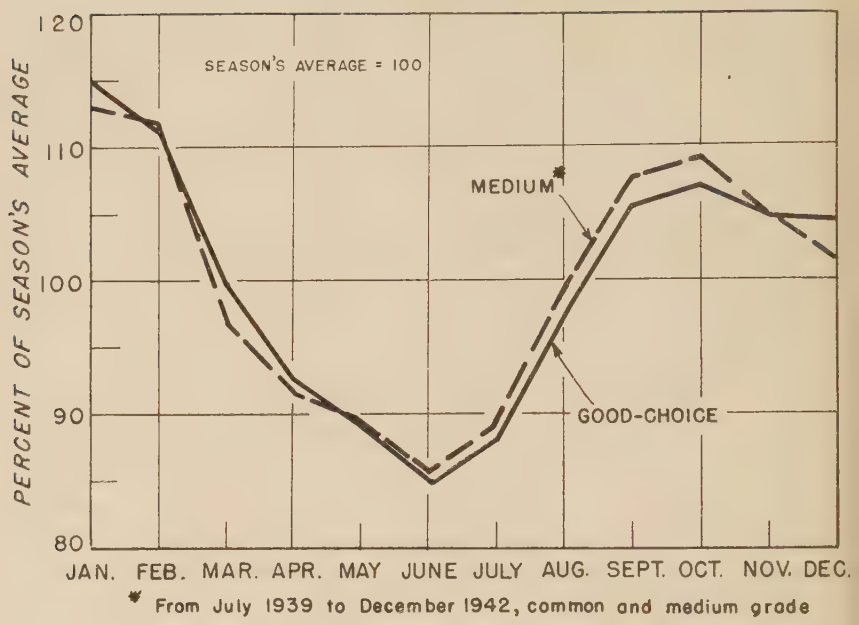

FIG. 3.— SEASONAL VARIATION IN PRICES OF GOOD-CHOICE AND MEDIUM GRADE VEAL CALVES, LOUISVILLE, 1932-42

Calculated by median-link-relative method. Data from annual mimeographed livestock price reports for Louisville, U. S. Dept. Agr.

TABLE 2.— CONSECUTIVE MONTH-TO-MONTH PRICE CHANGES OF GOOD AND CHOICE VEAL CALVES AT LOUISVILLE, 1932-42[a]

From —	Number of years that prices went —		Average percentage change in prices in the years when prices went —	
	Up	*Down*	*Up*	*Down*
January to February	3	8	8	— 6
February to March	3	8	6	—11
March to April	1	10	3	— 8
April to May	2	9	3	— 5
May to June	4	7	3	— 7
June to July	7	4	8	— 3
July to August	10	1	13	— 5
August to September	10	1	10	— 1
September to October	7[b]	3	4	— 7
October to November	4	7	3	— 5
November to December	5[c]	4	6	— 4
December to January	11	0	13	0

[a] Prices were from annual mimeographed livestock reports for Louisville, U. S. Department of Agriculture.
[b] No change one year.
[c] No change two years.

Average amount of price change, in percentage, from month to month, also is shown in Table 2. Of the years when prices rose from July to August and December to January, the average increase was

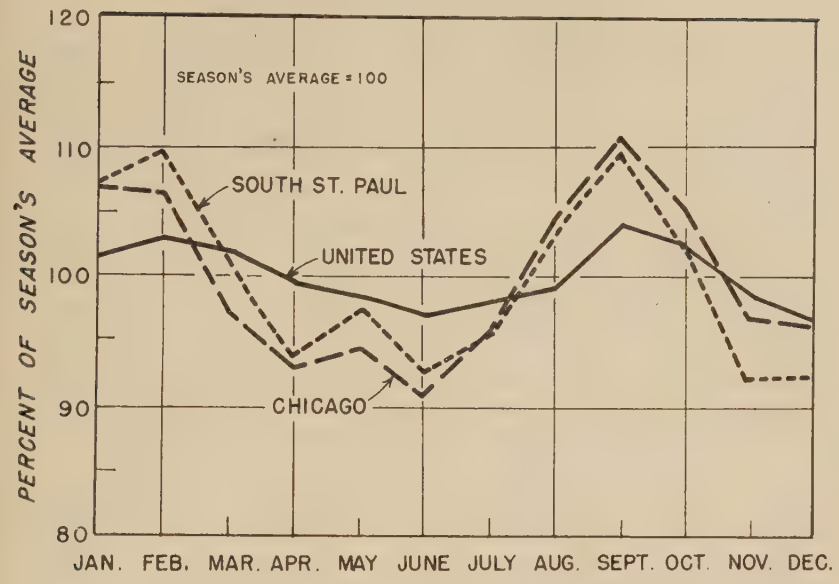

FIG. 4.— SEASONAL VARIATION IN PRICES OF GOOD-CHOICE VEAL CALVES, SOUTH ST. PAUL AND CHICAGO, AND AVERAGE PRICE RECEIVED BY FARMERS, UNITED STATES, 1932-42

Calculated by median-link-relative method. Data from annual mimeographed price livestock reports for South St. Paul and Chicago, U. S. Dept. Agr., and for United States from *Livestock, Meats and Wool Market Statistics and Related Data, 1942*, U. S. Dept. Agr., p. 65.

in each case 13 percent. In contrast, for the years when prices declined from February to March, the average decrease was 11 percent. These were the extreme percentage changes; other average month-to-month changes of the same direction ranged between them.

At South St. Paul and Chicago

Two of the largest markets for veal calves in the North Central States, an area important in the production of veal calves, are at South St. Paul and Chicago.[1] Prices at these two markets followed a somewhat similar pattern during 1932-42 (Fig. 4), but a somewhat different pattern from those of the markets serving Kentucky (Fig. 1). Prices at South St. Paul and Chicago were seasonally high during January and February, declined from February until April, increased slightly from April to May, and then declined from May

[1]Milwaukee is another market in this area with large receipts of veal calves, but price data are not available for this market.

TABLE 3.—CONSECUTIVE MONTH-TO-MONTH PRICE CHANGES OF GOOD AND CHOICE VEAL CALVES AT SOUTH ST. PAUL, 1932-42[a]

From—	Number of years that prices went—		Average percentage change in prices in years when prices went —	
	Up	*Down*	*Up*	*Down*
January to February	8	3	7	—10
February to March	3	8	4	—13
March to April	3	8	2	— 7
April to May	9	2	6	— 1
May to June	2	9	2	— 6
June to July	8	3	4	— 7
July to August	11	0	9	0
August to September	10	1	10	— 2
September to October	0	11	0	— 7
October to November	2	9	1	—10
November to December	7	4	5	— 4
December to January	11	0	18	0

[a] Prices were from annual mimeographed livestock reports for South St. Paul, U. S. Department of Agriculture.

to June. From June until September prices steadily increased; then declined from September to November. After remaining about the same from November to December, prices sharply increased from December to January.

While prices at Chicago were lowest during April and June, those at South St. Paul were lowest in November, December and June. Prices at Chicago varied from 91 percent of the season's average in June to 111 percent in September, a range of 20 percent of the season's average, while those at South St. Paul varied from 92 in November and December (93 in June) to 110 in February, a range of 18 percent of the season's average.

At South St. Paul,[1] prices of good and choice veal calves increased from July to August and from December to January in all 11 years during 1932-42, and from August to September in 10 of the 11 years (Table 3). Also, prices declined from September to October in all 11 years. Prices moved in the same direction, whether up or down, in 9 of the 11 years from April to May, May to June, and October to November; and in 8 of the 11 years from January to February, February to March, March to April, and June to July. The nearest to a balance in the up and down movement in prices from one month to the next occurred from November to December.

The average percentage price increase from December to January for the 11 years was 18 percent. For the 8 years when prices declined from February to March, the average decline was 13 per-

[1] The direction of price change from one month to the next was slightly more nearly equal for Chicago than South St. Paul, thus the seasonal pattern of prices as measured was slightly less stable.

cent. All other average price changes in the same direction from one month to the next ranged between these extremes.

In the United States as a Whole

The seasonal change in prices received by farmers in the United States as a whole was small during 1932-42 (Fig. 4). From April to August, prices ranged to as much as 3 percent below the season's average while in September and October the seasonal peak of prices (2 to 3 percent above the average) was reached. Small declines in November and December were followed by prices about 2 percent above the season's average during January, February, and March.

This seasonal range of only 6 percent of the average price for the year was quite small compared to the ranges in specific markets previously mentioned. Two factors likely are responsible for this much smaller seasonal variation. First, much of the seasonality of prices for veal calves on the different markets and in the different areas would tend to be averaged out because of the somewhat different seasonal patterns of prices in the different areas. Second, this price series represents the average quality of veal calves as marketed by farmers, and it is possible that month-to-month variation in quality (particularly in weight) over the year may have a leveling influence on the seasonal price pattern for the United States as a whole.

Seasonal Variations in Marketings of Veal Calves

At Louisville and at Four Kentucky Auction Markets

Receipts of veal calves at four auction markets[1] serving Kentucky farmers during 1932-42 increased seasonally from January to a peak in May, remained high during June, July and August, and then successively declined during the remaining months of the year (Fig. 5). Receipts during May, June, July, and August were over twice as large as those during November, December, January, and February. The seasonal pattern of "driven in" receipts at Louisville, a high percentage of which are veal calves from Kentucky and Indiana, was similar to that of marketings at the four auctions in Kentucky, though with slightly less variation over the year.

Receipts of veal calves at the four Kentucky auction markets in-

[1] Specific information is available on receipts of veal calves at these markets. For this information see *Prices and Market Data on Lambs, Hogs, and Veal Calves at Four Central Kentucky Livestock Auction Markets,* by A. J. Brown and C. D. Phillips, Ky. Agr. Exp. Sta. Bul. 459, p. 7, April 1944.

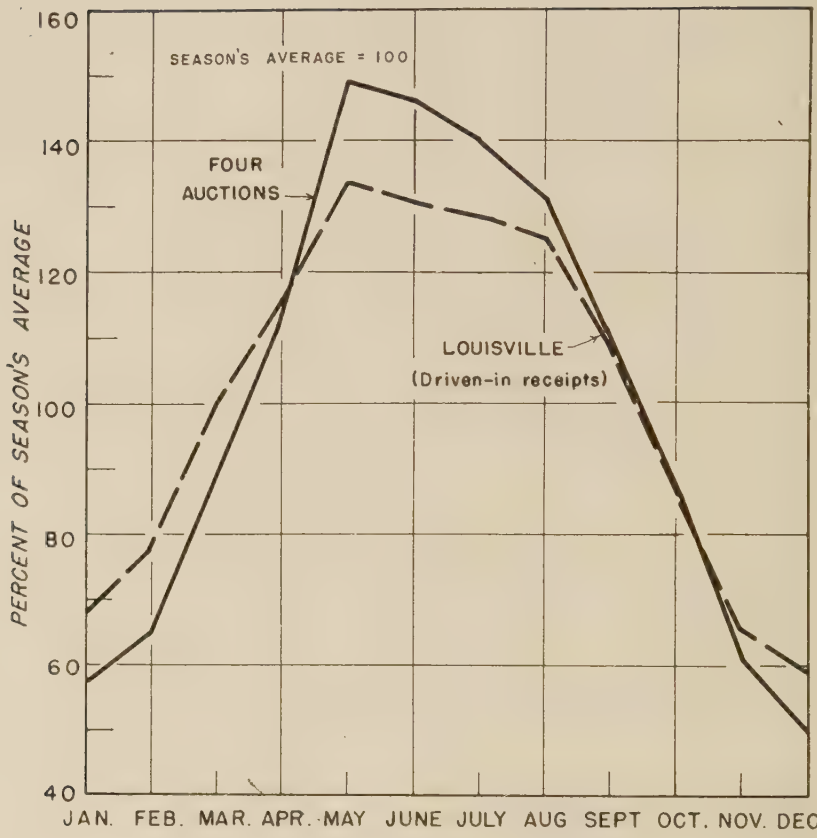

FIG. 5.— SEASONAL VARIATION IN RECEIPTS OF VEAL CALVES, FOUR CENTRAL KENTUCKY AUCTION MARKETS AND LOUISVILLE, 1932-42

Calculated by median-link-relative method. Data from Ky. Agr. Exp. Sta. Bul. 459, April 1944, p. 7, and from records of the Bourbon Stockyards Company, Louisville.

TABLE 4.— CONSECUTIVE MONTH-TO-MONTH CHANGES IN RECEIPTS OF VEAL CALVES AT FOUR CENTRAL KENTUCKY AUCTION MARKETS, 1932-42

From—	Number of years that receipts went —		Average percentage change in receipts in the years when receipts went —	
	Up	*Down*	*Up*	*Down*
January to February	9	2	19	— 5
February to March	11	0	36	0
March to April	11	0	28	0
April to May	11	0	30	0
May to June	5	6	13	— 9
June to July	4	7	12	— 9
July to August	2	9	2	—10
August to September	0	11	0	—17
September to October	0	11	0	—22
October to November	0	11	0	—31
November to December	2	9	10	—19
December to January	9	2	18	— 9

creased in all of the 11 years from February to March, March to April, and April to May, and decreased in all of the 11 years from August to September, September to October, and October to November (Table 4). In 9 of the 11 years, receipts (1) increased from December to January and from January to February, and (2) decreased from July to August and from November to December. Changes in receipts from May to June and from June to July were less regular in direction.

At South St Paul, Chicago, and Milwaukee

Receipts[1] of calves at South St. Paul, Chicago, and Milwaukee declined slightly from January to February during 1932-42, then sharply increased from February to seasonal peaks in March or April (Fig. 6). At Milwaukee the increase from 107 percent of the season's average in February to 143 in March was much greater than the increase at either South St. Paul or Chicago. After the high level of receipts during March and April, particularly at Milwaukee, receipts gradually declined at all markets, to 96 percent of the season's average in July at Chicago, to 58 percent in August at Milwaukee, and to 82 percent in August at South St. Paul. After increasing from July to October, receipts at Chicago declined the remainder of the year.

At South St. Paul receipts increased sharply from September to October, from 83 percent of the season's average in September to 111 percent in October, then remained above average through the rest of the year, but on a slight downward trend. At Milwaukee, receipts increased from 58 percent of the season's average in August to 110 percent in December. Receipts at all three markets increased from December to January. Seasonal variation in receipts averaged much greater at Milwaukee than at either Chicago or South St. Paul.

At South St. Paul,[2] receipts of calves increased in all 11 years from February to March and in 10 of the 11 years from September

[1] For South St. Paul shipments of stocker and feeder calves were subtracted from total receipts of calves in order to obtain as nearly as possible within the limitations of available data receipts of veal and slaughter calves. Data are not available with which to separate receipts of veal calves and slaughter calves. "Veal calves" are milk-fed calves that are usually sold before three months of age and at weights less than 240 pounds. "Slaughter calves" usually receive feed other than milk and are older and heavier than veal calves when sold. For further discussion of differences see *An Analysis of Prices of Veal Calves*, A. J. Brown, Ky. Agr. Exp. Sta. Bul. 483, April 1946.

[2] Directional changes in receipts between consecutive months at Milwaukee were more consistent than at South St. Paul, while directional changes at Chicago were less consistent than at South St. Paul.

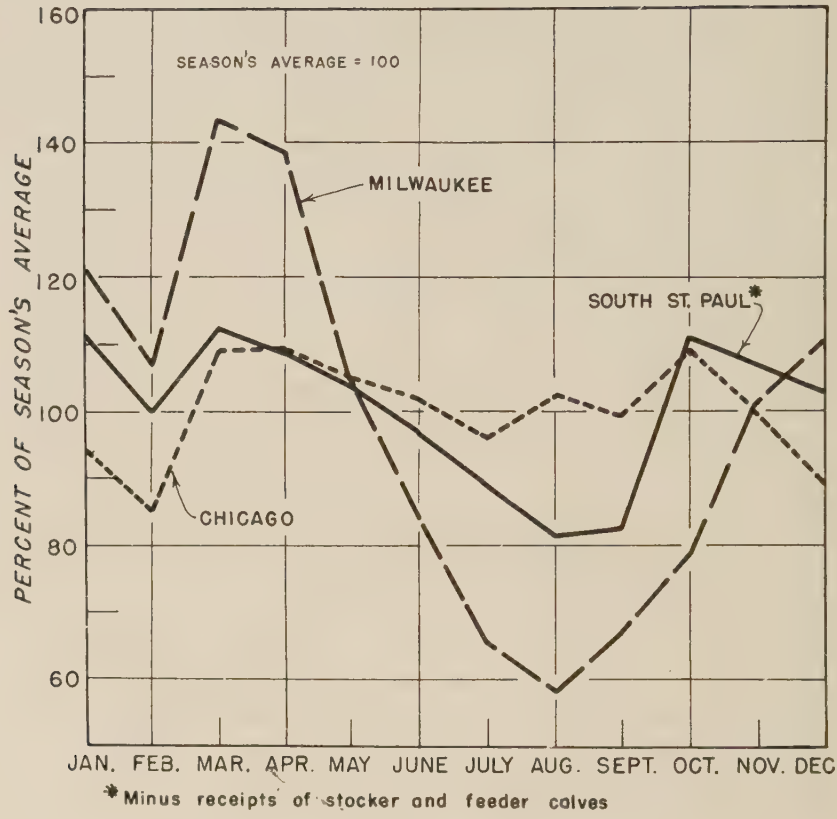

FIG. 6.—SEASONAL VARIATION IN RECEIPTS OF CALVES AT CHICAGO, MILWAUKEE, AND SOUTH ST. PAUL, 1932-42

Calculated by median-link-relative method. Data from *Crops and Markets*, and monthly reports on *Receipts and Disposition of Livestock at Public Stockyards*, U. S. Dept. Agr.

to October (Table 5). Decreases in receipts occurred most frequently from May to June, in 10 of the 11 years; from November to December, in 9 of the 11 years (no change one year); and from July to August and October to November, in 9 of the 11 years. Other month-to-month changes in receipts were less stable in direction, being more evenly divided between increases and decreases.

The average month-to-month percentage changes in receipts for the years when receipts moved the same direction, were greater than were the average month-to-month changes in prices of veal calves at either Chicago or South St. Paul.

TABLE 5.—CONSECUTIVE MONTH-TO-MONTH CHANGES IN RECEIPTS[a] OF CALVES AT SOUTH ST. PAUL, 1932-42

From—	Number of years that receipts went—		Average percentage change in receipts in the years when receipts went—	
	Up	*Down*	*Up*	*Down*
January to February	2	9	6	— 9
February to March	11	0	15	0
March to April	5	6	7	— 8
April to May	4	7	10	— 8
May to June	1	10	11	—10
June to July	3	8	33[b]	—12
July to August	2	9	11	—12
August to September	6	5	10	—10
September to October	10	1	37	—33[c]
October to November	2	9	11	—10
November to December	1[d]	9	3	— 9
December to January	7	4	13	— 5

[a] Minus stocker and feeder shipments. Data on total receipts and stocker and feeder shipments were from *Crops and Markets* and the monthly reports *Receipts and Dispositions of Livestock and Public Stockyards* (mimeographed), U. S. Department of Agriculture.

[b] If 1943 were excluded, because of the influence of drouth upon receipts, this would be 12 percent for the remaining two years.

[c] This counter-seasonal change was a result of the drouth of 1934.

[d] No change in one year.

In Different Dairy Producing Areas

Because of the close relation between marketings of veal calves and dairying, further understanding of seasonal variation in marketings of veal calves can be had by the study of receipts of calves at markets in the various dairy-producing areas. For this purpose the United States was divided into 8 areas: Eastern Corn Belt, Eastern Dairy, Northern Dairy, Southcentral and Southeast, Southwest, Western Corn Belt, West, and South.[1] These 8 areas can further be divided according to whether veal calves or stocker and feeder

[1] EASTERN CORN-BELT AREA includes the states of Michigan, Ohio, Indiana, and Illinois. Terminal markets in this area were Detroit, Michigan; Cincinnati, Cleveland, Dayton, and Toledo, Ohio; Evansville, Fort Wayne, Indianapolis, Lafayette, and Muncie, Indiana; Bushnell, Chicago, East St. Louis, Peoria, and Springfield, Illinois.

EASTERN DAIRY AREA includes the states of New York, Pennsylvania, New Jersey, Delaware, Massachusetts, Rhode Island, Connecticut, New Hampshire, Vermont, Maine, and Maryland. Terminal markets in this area were Buffalo and New York, N. Y.; Lancaster, Philadelphia, and Pittsburg, Pa.; Jersey City and Newark, N. J.; Boston, Mass.; and Baltimore, Maryland.

NORTHERN DAIRY AREA includes the states of Minnesota and Wisconsin. Terminal markets in this area were South St. Paul, Minn., and Milwaukee, Wis.

SOUTHCENTRAL AND SOUTHEAST AREA includes the states of Kentucky, Tennessee, Virginia, West Virginia, and North Carolina. Terminal markets in this area were Louisville, Ky., Chattanooga, Knoxville, Memphis, and Nashville, Tenn.; and Richmond, Virginia.

SOUTHWEST AREA includes the states of Texas, Oklahoma, New Mexico, and Arizona. Terminal markets in this area were El Paso, Fort Worth, Houston, Laredo and San Antonio, Texas; and Oklahoma City and Tulsa, Oklahoma.

WESTERN CORNBELT AREA includes the states of Iowa, Missouri, Nebraska, and Kansas. Terminal markets in this area were Sioux City, Iowa; Joplin, Kansas City,

(Footnote continued on following page.)

and slaughter calves predominated in the marketings of calves. In the Eastern Corn Belt, Eastern Dairy, Northern Dairy, and South-central-Southeastern areas, the marketings of calves are chiefly veal calves, yet the seasonal patterns of receipts[1] of calves for these areas differed considerably (Fig. 7). Most similar in pattern were the receipts in the Eastern Corn Belt and the Eastern Dairy areas. Receipts were seasonally lowest in February, December, and January. From the low point in February, receipts increased to May, remained high from then until the fall months, and then declined seasonally. Some of the receipts of calves in these areas from July through October are slaughter or stocker and feeder calves, many of which are shipped in from the West and Southwest.

An average pattern of seasonal variation in marketings of veal calves for the United States as a whole, would not be indicative of the pattern in any specific area, for the various geographic areas have different seasonal patterns. Probably the pattern of marketings in the Northern Dairy area represents the marketing of as many veal calves as any other area pattern. A major peak in marketings in this area occurred, during 1937-41, in March and April, with a minor peak in September through January. Receipts declined seasonally from April to August, then increased to October. The major peak was due to marketings of veal calves from the large number of cows that freshen in the late winter. Nearly twice as many calves were marketed in this area in either March or April as in August. The minor peak of marketings in September through January is, to a large degree, explainable by the practice of having a substantial number of cows freshen in the fall. Also, increased marketings of slaughter and stocker-feeder calves occur at this time.

Largest seasonal receipts of calves occurred at the markets in the

[1] Receipts of calves at each individual market represent the total livestock movement at the specified stockyards, including through shipments. This means some duplication in receipts at the various yards.

St. Joseph, St. Louis, and Springfield, Missouri; Omaha, Nebraska; Parsons and Wichita, Kansas.

WESTERN AREA includes the states of North Dakota, South Dakota, Montana, Wyoming, Colorado, Idaho, Utah, Nevada, California, Oregon, and Washington. Terminal markets in this area were West Fargo, N. D.; Sioux Falls, S. D.; Cheyenne, Wyoming; Denver and Pueblo, Colorado; North Salt Lake and Ogden, Utah; Los Angeles, South San Francisco, and Stockton, California; Portland, Oregon; and Pasco, Seattle, and Spokane, Washington.

SOUTHERN AREA includes the states of Arkansas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, and Florida. Terminal markets included were New Orleans, La.; Birmingham and Montgomery, Alabama; Atlanta, Georgia; and Jacksonville, Florida.

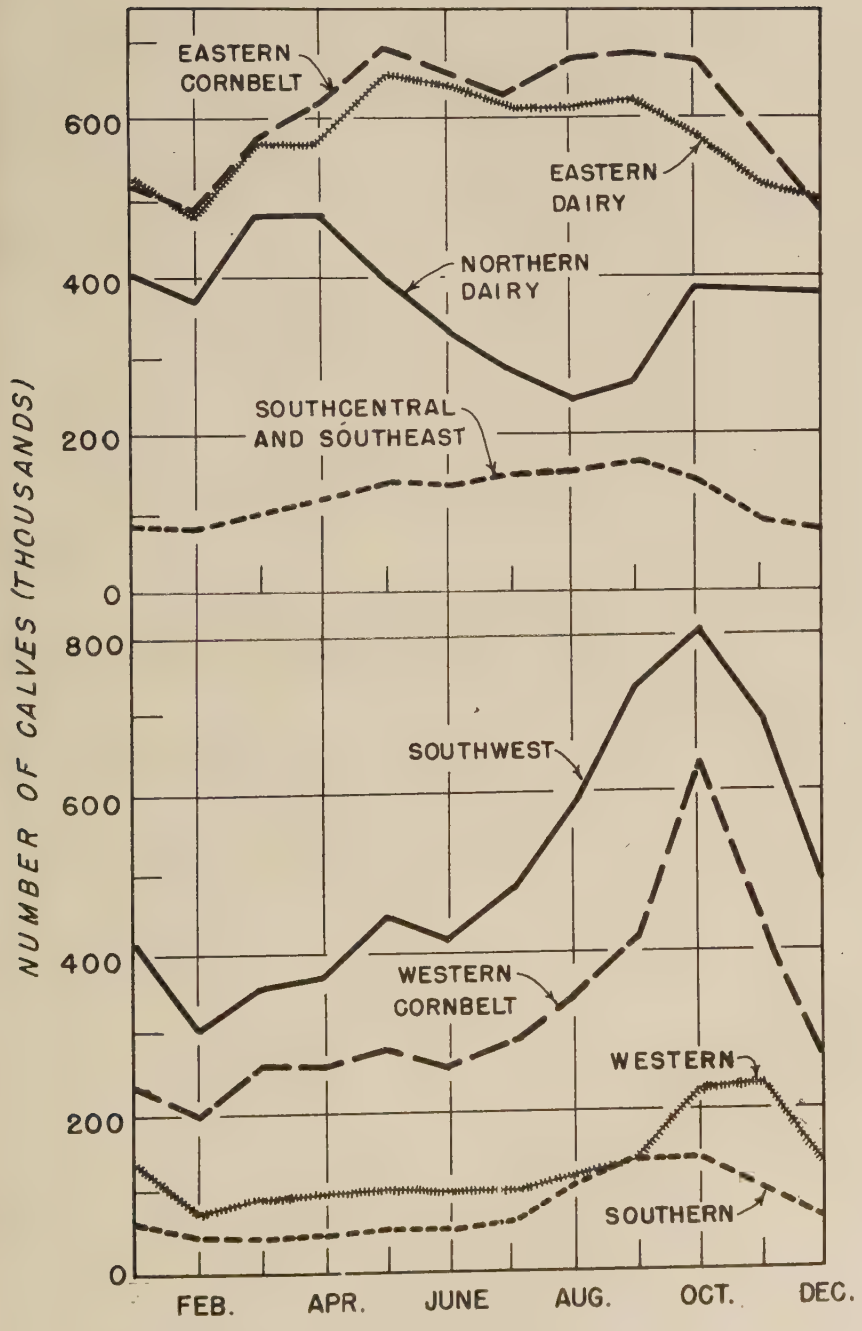

FIG. 7.—AVERAGE MONTHLY RECEIPTS OF CALVES AT TERMINAL MARKETS IN DIFFERENT AREAS OF THE UNITED STATES, 1937-41

Data from *Crops and Markets*, U. S. Dept. Agr.

Southcentral-Southeast area from May through September. The seasonal pattern there was similar to those of the Eastern Corn Belt and Eastern Dairy areas.

In the Southwest, Western Corn Belt, Western, and Southern areas, slaughter calves and stocker-feeder calves were marketed in important quantities. As a result the seasonal pattern of receipts of calves in these areas is quite different from the pattern where marketings of calves are chiefly veal calves (Fig. 7). By far the heaviest receipts were during October, September, and November.

In Federally Inspected Slaughter, United States

Slaughter of all calves (both veal and slaughter calves) by packers under federal inspection in the United States was, in recent years, seasonally low in December, January, and February (Fig. 8). From the low point in slaughter in February, numbers slaughtered increased sharply from February to March, increased more moderately in April, and remained high in May. This month-to-month increase in slaughter during 1932-42, from an index of 86 in February to 109

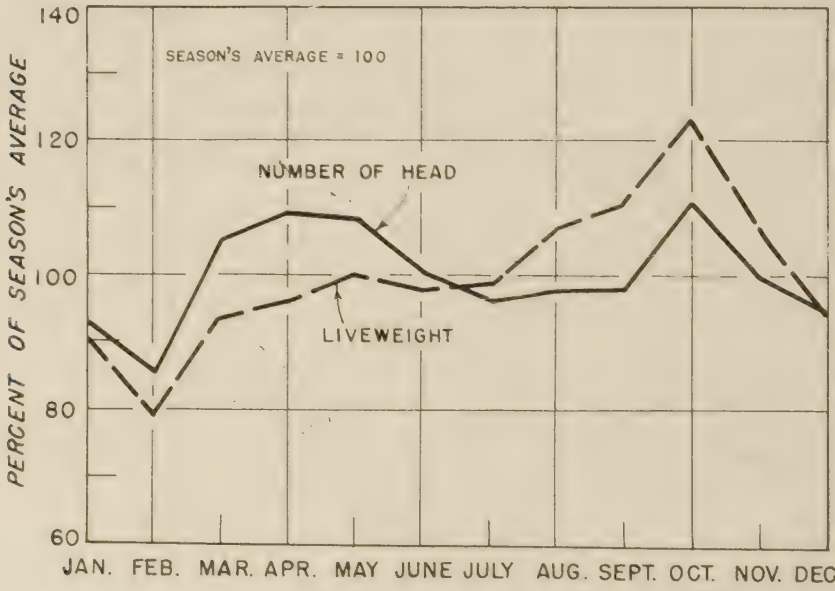

FIG. 8.—SEASONAL VARIATION IN NUMBER AND LIVEWEIGHT OF CALVES SLAUGHTERED UNDER FEDERAL INSPECTION, UNITED STATES, 1932-42

Calculated by median-link-relative method. Data from *Livestock, Meats and Wool Market Statistics and Related Data*, 1942, U. S. Dept. Agr., June 1943, pp. 30 and 88.

in April, was undoubtedly due primarily to increases in the marketing of veal calves. Numbers of calves slaughtered by these packers declined from May to July and then were relatively constant during August and September. The decline from May to June probably was due mainly to changes in the numbers of veal calves marketed. From July on through November, changes in the total number of calves were importantly influenced by the marketings of slaughter calves, the seasonal peak of which was reached in October. As slaughter calves were marketed at heavier weights, the total liveweight of calves slaughtered was greatest in August, September, October, and November, months when large numbers of these calves are moved to market.

Why Do Seasonal Patterns of Receipts Differ?

Differences in the seasonal variation in marketings of veal calves in different areas of the United States, as brought out in the preceding sections, are explainable by several factors. First, the season at which most dairy cows freshen differs somewhat from area to area. The primary market use of milk in the area, price plans that encourage uniform seasonal production of milk, and the desire for maximum utilization of pasture and roughage are important elements influencing the breeding program. Second, veal calves are marketed at different ages and weights in the various areas. While most calves in the market-milk-producing areas are sold within a few days to a few weeks from time of birth, many veal calves in areas where milk is lower in price are sold at ages between 2 and 3 months. An important factor in the difference between the peak of veal calf receipts at such a market as Milwaukee and the four auction markets in central Kentucky is the difference of 40 to 50 pounds in the average market weight of calves sold. Then, too, in Kentucky a higher proportion of the calves are Jerseys, which require a longer time to reach the heavier market weights than calves in the major-milk-producing areas where the heavier breeds predominate.

Change in the Seasonal Pattern of Receipts at Chicago

Seasonal variation in receipts of calves materially changed at Chicago during the 40 years, 1903-42, (Fig. 9) with a gradual change to less variation in receipts. The April peak of receipts in 1903-12 was 164 percent of the season's average receipts; in 1913-22, 149 percent; in 1923-32, 137 percent; and in 1933-42, 111 percent. Receipts in August-November, at the same time, have tended to increase. While the seasonal monthly range in receipts was from 60 to 164

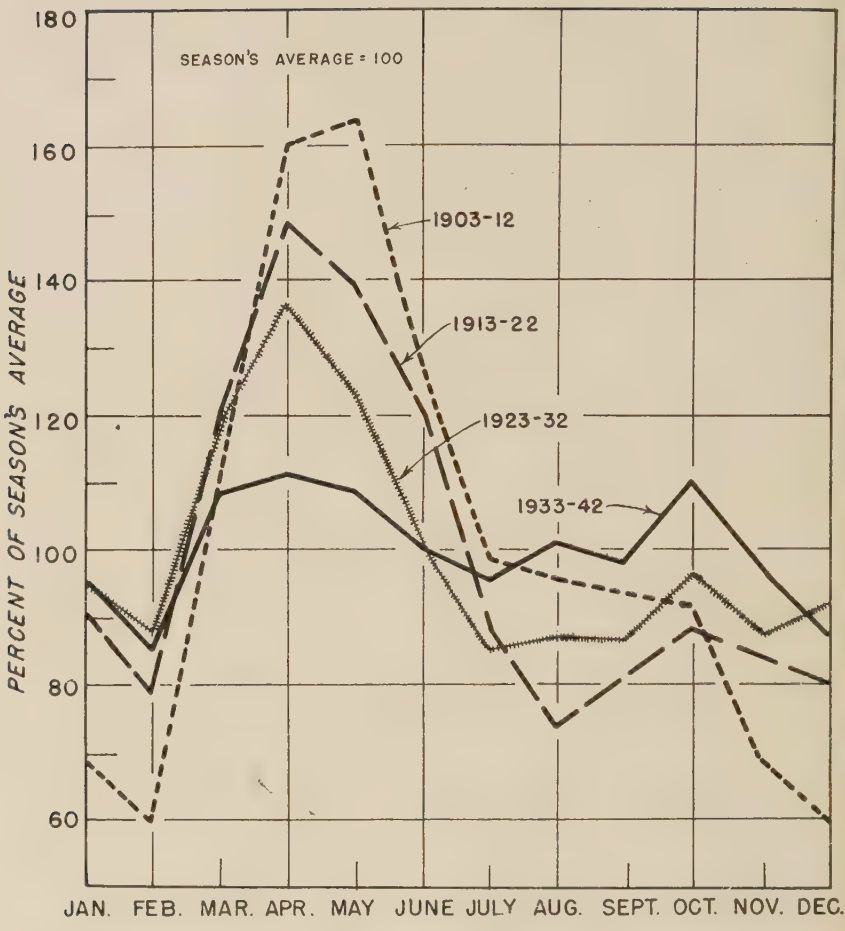

FIG. 9.—SEASONAL VARIATION IN RECEIPTS OF CALVES AT CHICAGO IN FOUR 10-YEAR PERIODS, 1903-42

Calculated by median-link-relative method. Data from *Drovers Journal Yearbook of Figures of the Livestock Trade,* for 1924 and 1942, Chicago Daily Drovers Journal, Chicago, 1925, p. 17, and 1943, p. 17.

percent of the season's average in 1903-12, it was only from 85 to 111 percent in 1933-42.

Changes in feeding practices and rations, including the addition of silage to dairy rations, and the increasing change to more uniform year-round production of milk were important factors responsible for the leveling out of the seasonal variation of receipts of calves in this market. Price plans that favored increased fall and winter pro-

duction of milk in the Chicago area were a stimulus to more uniform monthly production of milk.

The trend in receipts of calves at Chicago was sharply downward after 1925. If this downward trend were mainly a result of the diversion of receipts from the outlying areas of the market to other livestock markets, then a larger proportion of the remaining receipts would come from areas closer to Chicago. More of the market area for calves would thus be superimposed on the area of the Chicago milkshed. It is logical to expect less seasonal variation in receipts of veal calves from an area producing fluid milk and having price plans to encourage uniform seasonal production of milk, than from areas producing butterfat and whole milk for processing. This possible shift in the livestock market area could thus have been an important factor in accounting for less seasonal variation in receipts of veal calves at Chicago during 1923-32 and 1933-42 than during 1903-12.

An important proportion of receipts of calves on this market is from herds that produce milk for fluid consumption. While data are not available for as long a time for all livestock markets in or near large cities, there was probably also some tendency toward more uniform receipts of calves at these markets in more recent years.

Seasonal Variation in Weight and Quality of Calves

Weight of Veal Calves Sold at Four Kentucky Auction Markets

The average weight of all veal calves sold at the four Kentucky auction markets varied seasonally between 20 and 25 pounds in most years from 1926 to 1943 (Fig. 10). The seasonal pattern of weight of marketings was divided into three periods (1926-29, 1930-37, and 1938-43) because of changes in the predominant weights of calves marketed. The patterns of average weights were similar for the three periods. Months when the average weight of calves marketed was lowest were December, January, February, March, and April. The average weight of marketings increased rapidly from April through June, and remained seasonally high through October. The average weight of veal calves in each month of 1938-43 exceeded the weight in the corresponding months of 1926-29 by 12 to 20 pounds.

The same general seasonal pattern existed in the average weight of veal calves sold in the top order-buyer pens[1] (Fig. 11), but the

[1] The term "order-buyer pens" is used to denote a pen of a sufficient number of graded veal calves to interest a buyer who ships veal calves in deckloads.

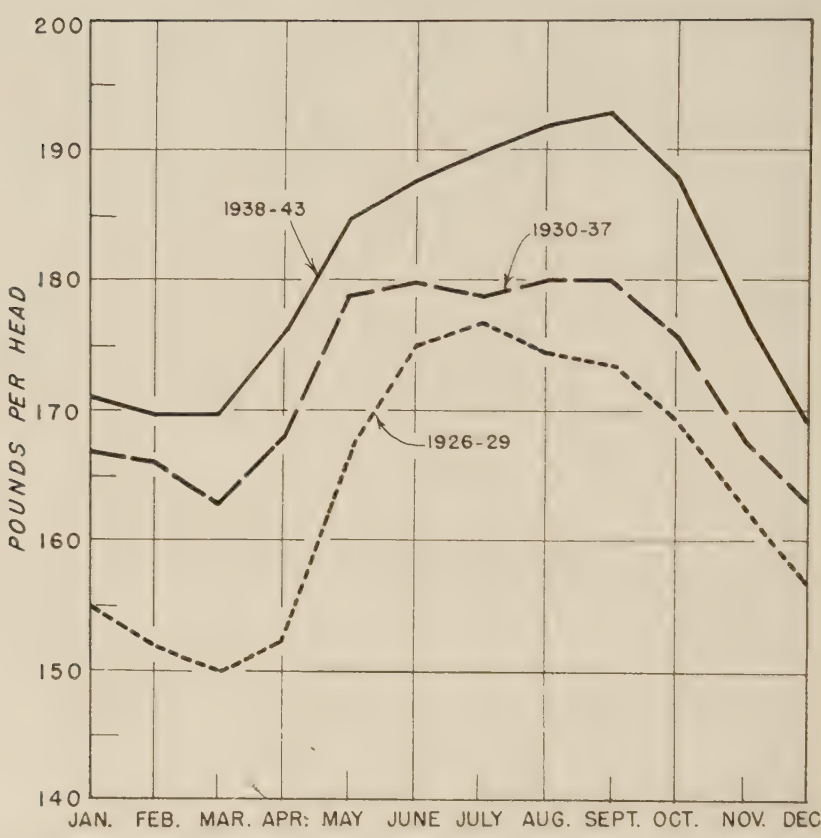

FIG. 10.—AVERAGE WEIGHTS OF ALL VEAL CALVES MARKETED IN DIFFERENT MONTHS AT FOUR CENTRAL KENTUCKY AUCTION MARKETS, BY PERIODS, 1926-43
Data from Ky. Agr. Exp. Sta. Bul. 459, p. 11.

seasonal change in weight was much less. The range in monthly weights was from 183 pounds in March to 192 pounds in September for the 1938-43 period. The average weight of all veal calves sold in these pens in each month of 1938-43 exceeded the average weight in the corresponding month of 1926-29 by 7 to 11 pounds.

The seasonally heavier weights of marketings of veal calves in Kentucky from May through September probably is mainly a result of seasonally low prices of butterfat (see Fig. 14, p. 28) during this season. Then, too, it is during this time of year that the labor needs of tobacco and other crop enterprises are at a high level. By leaving the calves with the cows on pasture, as is often done, the labor needs of the milk enterprise are reduced.

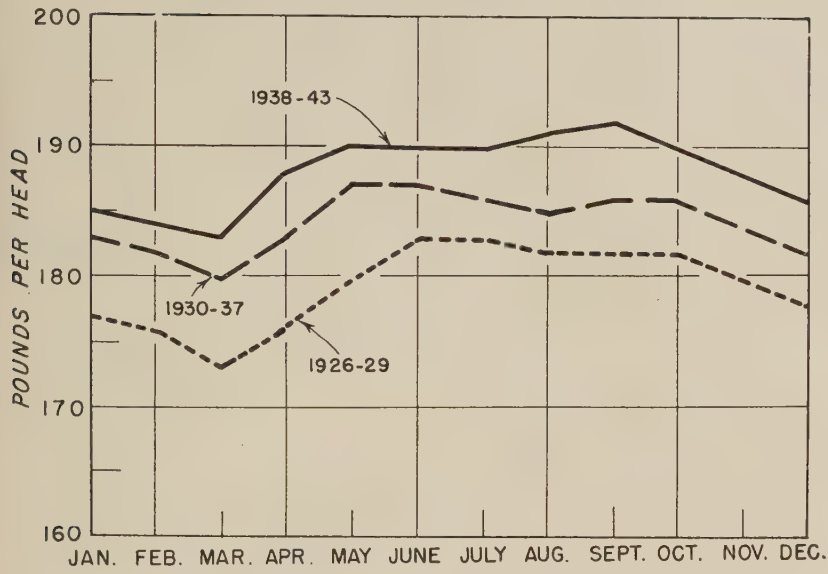

FIG. 11—AVERAGE WEIGHT OF VEAL CALVES IN TOP ORDER-BUYER PENS IN DIFFERENT MONTHS AT FOUR CENTRAL KENTUCKY AUCTION MARKETS, BY PERIODS, 1926-43

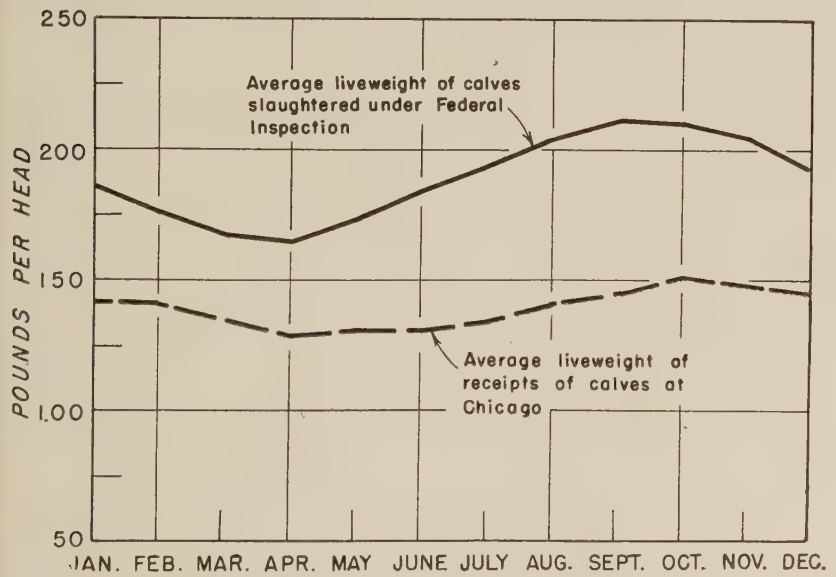
250
200
150
100
50
POUNDS PER HEAD
Average liveweight of calves slaughtered under Federal Inspection
Average liveweight of receipts of calves at Chicago
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

FIG. 12.—AVERAGE LIVEWEIGHT OF CALVES SLAUGHTERED UNDER FEDERAL INSPECTION, UNITED STATES, AND OF RECEIPTS OF CALVES AT CHICAGO, IN DIFFERENT MONTHS, 1932-42

Data from *Livestock, Meats and Wool Market Statistics and Related Data*, 1942, p. 78, U. S. Dept. Agr., and *Drovers Journal Yearbook of Figures of the Livestock Trade* for 1942, p. 71.

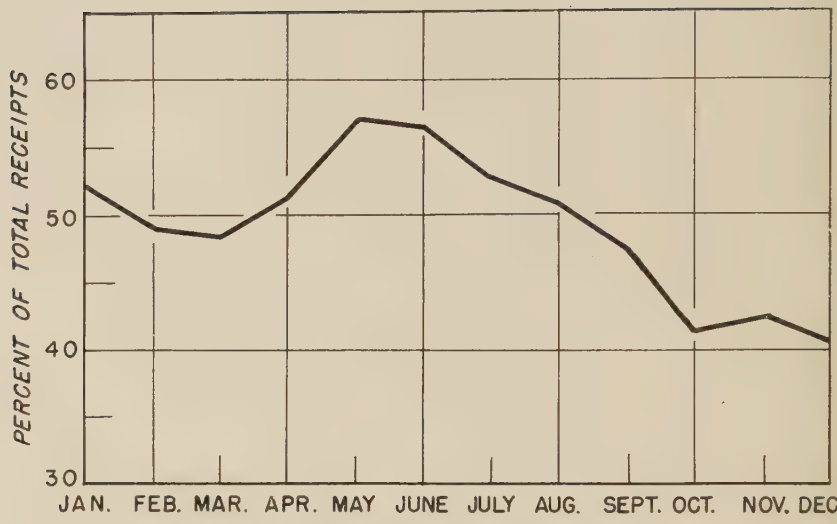

FIG. 13.—CALVES IN TOP ORDER-BUYER PENS IN PERCENT OF TOTAL RECEIPTS OF CALVES, IN DIFFERENT MONTHS, AT FOUR CENTRAL KENTUCKY AUCTION MARKETS, AVERAGES, 1929-42

Weight of Receipts at Chicago[1]

Average weight of receipts of calves at Chicago during 1932-42 varied between 128 pounds in April to 150 pounds in October (Fig. 12). The average weight declined from February to April, gradually rose until the seasonal peak in October, then slowly declined until January. Increased marketings of calves other than veal calves likely were responsible for the heavier average weights during the fall months.

Weight of Calves Slaughtered Under Federal Inspection

The average weight of calves slaughtered under federal inspection was lowest in March, April, and May, and highest in August, September, October, and November (Fig. 12). The low average weight of about 170 pounds in March, April, and May was due to the large proportion of veal calves being marketed at that time and also to seasonally large receipts at markets where veals were sold at light weights. The average weight of calves slaughtered during 1932-42 increased seasonally from the spring months to a peak of about 210 pounds in August, September, October, and November. This high average weight of marketings during those months was primarily due to a proportionally larger marketing of slaughter calves.

[1] Similar information was not found for South St. Paul or Milwaukee.

Seasonal Changes in Quality of Veal Calves at Four Kentucky Auction Markets[1]

An indication of seasonal change in quality of calves marketed at the four Kentucky auctions is the change from month to month in the proportion of total calves sold in the top order-buyer pens (Fig. 13). The average pattern shown in Fig. 13 is not very stable, as any one year may differ considerably from it. The largest proportion of calves sold in the top order-buyer pen for the 1926-43 period occurred in May and June when about 57 percent of all calves sold at these markets were placed in the top-grade pens. These were also two of the months of largest receipts (see Fig. 5, p. 12). After June, the proportion gradually declined until in December only about 40 percent of all calves sold were in the top pens, then increased sharply from December to January (from about 40 percent to 52 percent), and then declined to 48 percent in March before beginning the increase to the May peak.

Relation of Prices to Receipts

Prices of veal calves in markets which serve Kentucky have been shown to be seasonally high in January and February, to decline steadily through June, then to rise sharply until September, and to remain above the season's average from September through December (Fig. 1, p. 6). Prices of veal calves in Jersey City, a market in an area to which many Kentucky veal calves are shipped, have shown similar seasonal changes. Prices in some of the other veal calf markets, such as South St. Paul and Chicago, move seasonally somewhat differently.

Detailed analysis of the relation of market receipts to prices is handicapped first by the fact that prices on Kentucky markets naturally are affected by prices and receipts at other livestock markets in the United States, and second by the lack of specific information on the receipts of veal calves on those markets. The following general interpretations, however, can be made:

1. Declining prices from January through June at markets serving Kentucky occurred when: (a) receipts of calves were increasing in Eastern Dairy and Eastern Corn Belt areas (Fig. 7, p. 17); (b) receipts of veal calves at Kentucky markets, as indicated by re-

[1] Sufficient data are not available to permit study of seasonal changes of quality of veal calves at South St. Paul, Chicago, or Milwaukee.

ceipts of driven-in calves at Louisville and receipts of veal calves at the four Kentucky auctions, were increasing from 67 percent of season's average in January to 134 and 133 percent in May and June, respectively (Fig. 5, p. 12). Also, from February to May was a period when numbers of calves slaughtered under federal inspection were increasing or were at a high level (Fig. 8, p. 18). Such seasonal changes in receipts could well have been responsible for much of the seasonal price decline from January to June at markets serving Kentucky.

2. Rising seasonal prices from June to September at markets serving Kentucky occurred when: (a) receipts of calves were at a high level at markets in the Eastern Dairy and Corn Belt areas, (Fig. 7, p. 17); (b) receipts of veal calves were declining, at Kentucky markets, but still were above the season's average (Fig. 5, p. 12). From June through September numbers of calves slaughtered under federal inspection were also near the season's average (Fig. 8, p. 18). Such changes in receipts, however, do not adequately explain why prices for veal calves rose from June to September. Turning elsewhere for changes in receipts that may have been of influence, it was during this period that receipts of calves at such important veal markets as Milwaukee and South St. Paul were declining to the seasonal low of the year (Fig. 6, p. 14). Further, while the numbers of calves slaughtered under federal inspection were about average during the period, the increase in the average liveweight of calves slaughtered from July to September (Fig. 12, p. 23) indicates that an increasing proportion of the calves were slaughter calves. Actually, it is likely that receipts of veal calves alone, nationally, and at the markets in the Eastern Dairy and Eastern Corn Belt areas were decreasing during these months. The price rise at markets serving Kentucky during June through September likely was at least partly associated with declining receipts of veal calves.

3. Above the season's average price from September through December[1] at markets serving Kentucky occurred when: (a) receipts of calves in the Eastern Dairy and Eastern Corn Belt areas were declining (Fig. 7, p. 17); (b) after October, numbers of calves slaughtered under federal inspection were declining, but still near the season's average (Fig. 8, p. 18); (c) receipts of veal calves at Kentucky markets were sharply declining (Fig. 5, p. 12). These changes

[1] Price changes from month to month during September through December were not particularly stable.

in receipts do not adequately explain the rather level seasonal movement of prices of veal calves at markets serving Kentucky during these months.[1] Other factors, such as changes in the supplies of other meat animals and seasonal changes in consumers' preferences for veal may have had some influence upon prices during these months. Prices of veal calves at South St. Paul and Chicago declined sharply from September to November as receipts of calves at these markets increased to above the season's average. The sharp decline in receipts of veal calves at Kentucky markets may have cushioned a possible seasonal decline in prices at Kentucky markets such as occurred at South St. Paul and Chicago.

4. A high degree of similarity of seasonal price patterns was evident between Jersey City and those markets in or near Kentucky. Part of this high degree of similarity may have been due to the important position of Jersey City, and other nearby eastern markets and packers as the final outlet for Kentucky calves.[2] It would be expected that order and packer buyers at Kentucky markets, purchasing for eastern shipment, would closely observe prices on the markets near the packers to whom the calves were consigned.[3] It would also be expected that packers in the East, who buy Kentucky calves, would use to some extent as the price standard for their purchases, prices on the important nearby markets for calves. Of course, order buyers in Kentucky purchasing for eastern shipment face competition of order and packer buyers purchasing for Kentucky packers, and such competition likely would alter any buying strictly on a Jersey City basis.

Seasonal Relation of the Price of Veal Calves to the Price of Butterfat, Kentucky

As has been mentioned previously, the raising of veal calves, particularly when they are marketed at heavy weights, may be thought of as a means of marketing milk. The relation between seasonal variation in the price of veal calves and in the price of milk or but-

[1] Part of the sharp increase in prices at markets serving Kentucky from December to January likely was due to declining receipts at many of the livestock markets as reflected by the decline from December to January in number of calves slaughtered under federal inspection.

[2] Over two and one-half times as many calves were shipped from Kentucky to the East in 1939 as were bought by packers from Kentucky and nearby states.

[3] Speculators buying on Kentucky markets for purpose of resale on eastern markets also would be directly interested in prices on eastern markets.

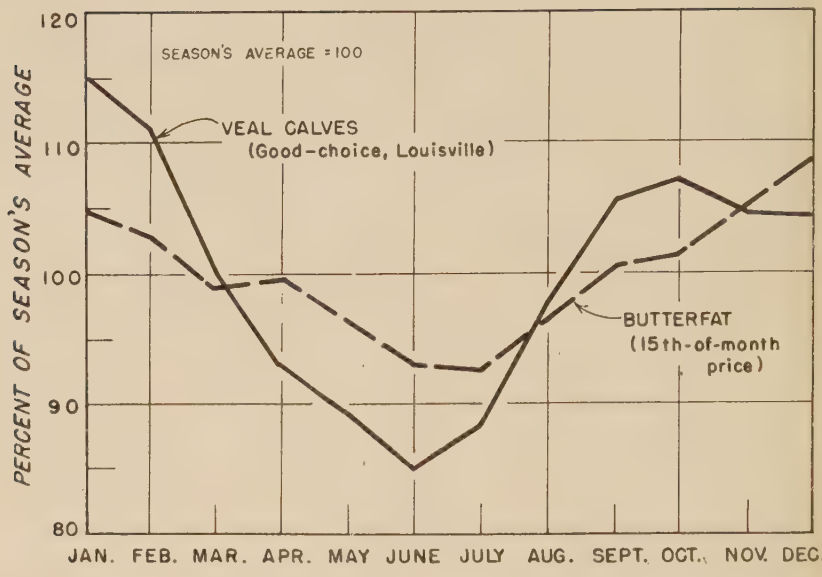

FIG. 14.— SEASONAL VARIATION IN PRICES OF VEAL CALVES AND OF BUTTERFAT, KENTUCKY, 1932-42

Calculated by median-link-relative method. Data for calves from annual mimeographed livestock price reports for Louisville, U. S. Dept. Agr., and for butterfat from U. S. Dept. Agr. *Crops and Markets and Agricultural Prices.*

terfat may be expected to influence farmers' decisions on whether or not to use this alternative market outlet for milk.

Seasonal Variation in Prices of Veal Calves and Butterfat, Kentucky

Prices of both veal calves and butterfat in Kentucky during 1932-42, followed a downward seasonal movement from January through June (Fig. 14). The degree of seasonal variation was, however, over twice as great for veal calves (115 in January to 85 in June) as for butterfat (105 to 93).[1]

After July, prices of butterfat rose each succeeding month while prices of veal calves increased from June to October, then declined slightly the remainder of the year. Butterfat was seasonally high during November, December, and January, and veal calves were seasonally high in January, February, September, and October. Months of low prices for veal calves and butterfat were June and July.

[1] The seasonal pattern of prices of veal calves was more stable than that for butterfat as measured by the frequency in month-to-month changes in prices in the same direction during 1932-42.

TABLE 6.— AVERAGE AMOUNT BY WHICH THE VALUE OF A 185-POUND VEAL CALF MARKETED IN DIFFERENT MONTHS EXCEEDED THE VALUE OF BUTTERFAT CONSUMED, KENTUCKY, 1932-42

Month calf marketed	Market value of 185-pound good-choice calf[a]	Calf of 90 pounds at birth		Calf of 55 pounds at birth	
		Value of butterfat consumed[b]	Amount value of calf exceeded value butterfat consumed	Value of butterfat consumed[b]	Amount value of calf exceeded value of butterfat consumed
January	$19.67	$10.69	$8.98	$14.59	$5.08
February	19.00	10.44	8.56	14.48	4.52
March	17.04	10.12	6.92	14.03	3.01
April	15.85	9.96	5.89	13.81	2.04
May	15.21	9.83	5.38	13.53	1.68
June	14.50	9.51	4.99	13.25	1.25
July	15.08	9.30	5.78	12.91	2.17
August	16.67	9.47	7.20	12.91	3.76
September	18.04	9.87	8.17	13.25	4.79
October	18.30	10.12	8.18	13.70	4.60
November	17.89	10.36	7.53	14.09	3.80
December	17.85	10.73	7.12	14.48	3.37

[a] Value based upon price of good-choice veal calves at Louisville.

[b] Assuming that 10 pounds of milk is used for each pound of gain. Average butterfat test in Kentucky during 1932-42 was 4.3 percent. This would mean that for a 90- and 55-pound calf at birth to reach a market weight of 185 pounds, 40.8 and 55.9 pounds of butterfat, respectively, would be in the milk consumed. Taking an average gain of 2 pounds daily for the calf of 90 pounds birthweight, and 1.75 for the calf of 55 pounds, about 48 and 74 days, respectively, would be needed to reach the market weight of 185 pounds. Average price of butterfat, from the 15th-of-the-month series, for the month of marketing and the month preceding were thus used in calculation of value of butterfat consumed by the calf of 90 pounds birthweight. For the 55-pound calf, the month of marketing and the two preceding months were used. Seasonal variations in prices of veal calves and butterfat were calculated by median-link-relative method.

Seasonal Value of Veal Calf and of Butterfat Consumed by It

In order to compare the value of a veal calf with the value of the butterfat in the milk consumed by it, the following procedure was used:[1]

1. Calves of two different birthweights were used, 90 pounds and 55 pounds.

2. Calves were assumed to be marketed at a weight of 185 pounds, regardless of the month when marketed or of the birthweight of the calves.

3. It was assumed that it takes 10 pounds of milk for a gain of one pound of the veal calf.

Using this procedure the market value of the calves, of different birthweights can be compared with the value of butterfat in the milk[2] utilized in the production process (Table 6 and Fig. 15). When this seasonal pattern is analyzed strictly from the standpoint of the value of the veal calf when marketed and the value of butterfat

[1] For more detailed methodology see footnote to Table 6.

[2] Value of milk used in the production process would include the value of butterfat and an allowance for the value of skimmilk. No allowance was made for value of skimmilk in this study.

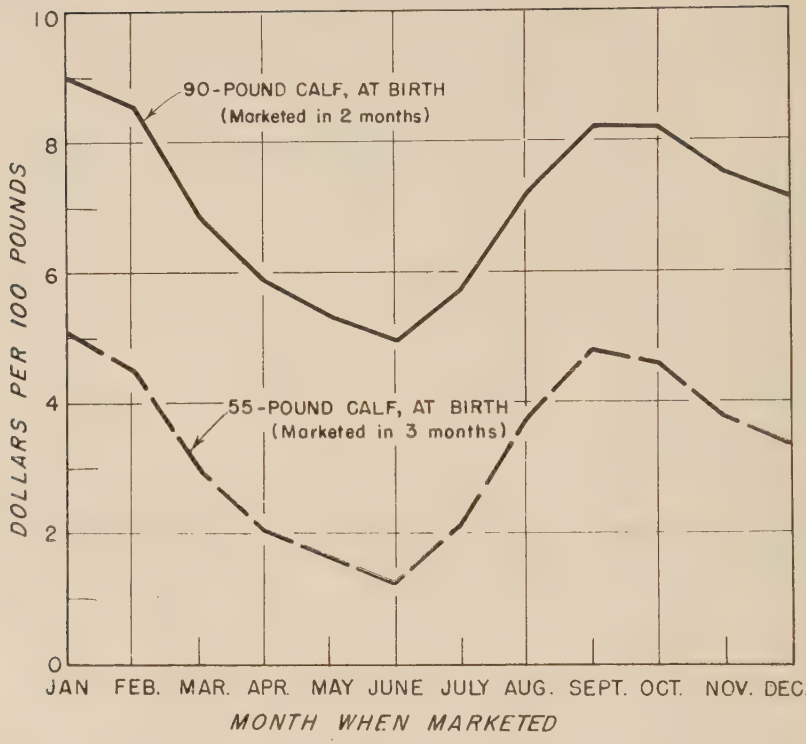

FIG. 15.—AMOUNT BY WHICH THE AVERAGE MARKET VALUE, IN DIFFERENT MONTHS, OF A 185-POUND VEAL CALF EXCEEDED THE VALUE OF BUTTERFAT IN THE MILK CONSUMED BY THE CALF IN GROWTH, KENTUCKY, 1932-42

consumed by the calf during growth, for the 1932-42 period, the following characteristics are evident:

1. Margins between value of calf when marketed and value of butterfat utilized in production were seasonally largest for calves marketed in January. These margins were $8.98 for the calf of 90 pounds at birth and $5.08 for the calf of 55-pound birthweight.

2. The margins reached a secondary peak in September and October only slightly lower than that of January (and also February in the case of the calf of 90-pound birthweight). These margins were $8.17 and $8.18 respectively, for the calf of 90-pound birthweight and $4.79 and $4.60, respectively, for the calf of 55 pound birthweight.

3. Lowest margins occurred during June, being $4.99 for the calf of 90-pound birthweight and $1.25 for the calf of 55-pound birth-

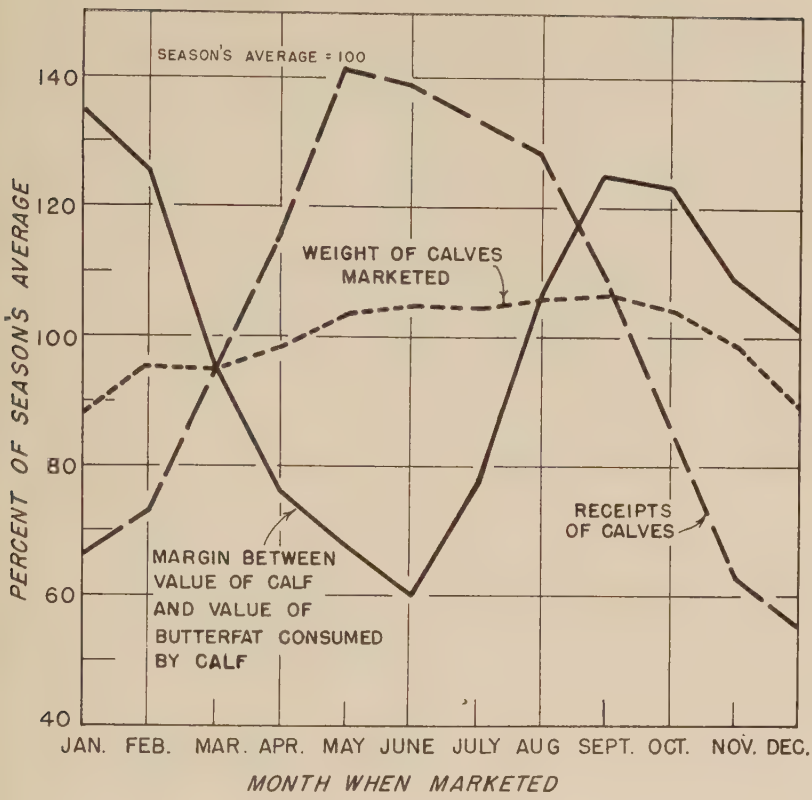

FIG. 16—SEASONAL CHANGES IN RECEIPTS AND IN MARKET WEIGHTS OF VEAL CALVES, AND THE MARGINS BETWEEN VALUE OF THE CALVES WHEN MARKETED AND BUTTERFAT-FEED COST, KENTUCKY, 1932-42

Receipts are an average of those at four central Kentucky auction markets and the "driven-in" receipts at Louisville. Weights are for all calves received at the four auction markets. Margins are an average of those for calves of 90- and 55-pound birthweight (see Table 6).

weight. Margins during April and May were less than $1 greater than those of June.

4. Margins during August and November also were comparatively high in relation to those of the spring months, being about $2.50 greater than in June for both the calf which weighed 90 pounds and that which weighed 55 pounds at birth.

Marketing of Calves and Margin Seasonal Pattern

A high degree of inverse relationship existed between the seasonal change from January to September in the margin between market

value of calves and butterfat-feed costs on the one hand, and the marketings of calves during 1932-42, on the other (Fig. 16). From September to December, both margins and receipts declined, with receipts declining at the faster rate. Average weight of calves marketed changed but little from May to September, while margins went from the seasonal low in June to the secondary seasonal peak in September.

Veal Calves as Markets for Milk in Kentucky

While it is likely that veal calves receive little economic attention on most commercial-herd farms[1] in Kentucky, the raising of veal calves to heavier weights is given consideration on many family cow and small-herd farms. That many farmers have used veal calves as a means of marketing milk is evidenced by the reported average weight of 170 pounds[2] for all calves sold in Kentucky in 1943. The average weight of all veal calves sold at the four Kentucky auction markets was 189 pounds in 1943, and averaged 173 pounds for the 18 years 1926-43. As most Kentucky veal calves are from Jersey breeding, and are thus light calves at birth, an average market weight of 189 pounds (or of 173 pounds) means that a substantial quantity of milk is used in veal production (see p. 4).

Obstacles to Marketing Veal Calves when Margins are Wide

Several obstacles stand in the way of marketing veal calves in January and February, when the margin between the value of the veal calf and the value of butterfat in the milk consumed by that calf was the largest. Calves would have to be born in October, November, or December, depending upon the month when marketed and the weight of calf at birth, in order to be marketed at a 185 pound weight in January or February. More care would need be given to the cow and calf at this time of the year. Many farms have barn facilities inadequate for care of young calves, and pastures would not provide as good a source of feed as in the summer and fall months. Further, and quite important on many of the family-cow farms and small-herd farms, the breeding efficiency of cows in January, February, and March is at a low level for October-December calving because of inadequate supply of vitamin A in the available feed supply.[3]

[1] See Table 1, page 4, for classification of dairy enterprises of Kentucky.

[2] Information from the U. S. Department of Agriculture.

[3] Fordyce Ely and Lynn Copeland, *More Profit From Your Milk Cows*, Ky. Agr. Coll. Ext. Leaflet 83, 1944, p. 5.

Fewer obstacles stand in the way of June and July freshening. By late summer the breeding time for June-July freshening, cows have obtained enough vitamin A in the grass for breeding efficiency to be at a high level. Cows and calves can be turned out on pasture, as is ordinarily done, so as to reduce the labor requirements for them at a time when labor needs are large for tobacco and other crops.

The accepted practice of spring freshening of cows is perhaps the primary obstacle in the way of many farmers on family-cow farms or small-herd farms in changing to a milk-production program that will allow[1] them to market veal calves advantageously in relation to butterfat-feed costs. As winter pastures in Kentucky continue to improve through larger acreages of adapted varieties of winter grains and legumes and improved pasture management, and with more hay available as a result of continued increased production of hay on farms, greater flexibility in the milk-production program in Kentucky will be practical.

More detailed analysis of the advantages and disadvantages of marketing veal calves during January-February and September-October, in face of the relative high price of veal calves to butterfat, is a subject for additional research. The present lack of data on the relative costs of fall and spring freshening in Kentucky, where pasture is so important a source of feed, limits the extent of the present analysis. The fact remains, however, that a greater value above the value of the butterfat consumed by veal calves is obtained from the marketing of calves in January or February and in September or October than at any other season. Also veal calves marketed during May, June, July (the months of peak marketings in Kentucky) are of the lowest value of the year in relation to the value of butterfat consumed.

Summary

Many farmers in Kentucky market a part of the farm's milk production in the form of veal calves. In 1943, about 300 million pounds of milk was used in the production of veal calves in Kentucky, compared to 21 million pounds of milk sold in the form of farm butter, 491 million pounds sold in the form of cream, 655 million pounds sold as whole milk to processors or distributors, and 145 million pounds sold at retail by farmers as milk or cream. It is likely

[1] Providing the seasonal pattern of prices of veal calves and butterfat is similar to that of 1932-42.

that veal calves as a market for milk in Kentucky receive particular attention on the family-cow farms (1 and 2 cows per farm) and the small-herd farms (3 to 9 cows). These two groups accounted for 84 percent of all milk cows on farms in Kentucky in 1939. This being the case, the seasonal aspects of veal calves, the seasonal relationships of prices of veal calves and of butterfat, and factors responsible for these seasonal changes are subjects for consideration.

In the present study of the seasonal aspects of veal calf prices and marketings, the main findings were as follows:

1. Prices of quality veal calves were seasonally highest during January and February, declined gradually from February to the seasonal low in June, rose sharply from June to September, remained above the season's average from September through December, and then rose sharply in January. Prices at Louisville varied from 115 percent of the season's average in January to 85 percent in June, a range of 30 percent. The seasonal pattern of prices, as a whole, was quite stable. The price pattern of medium-grade veal calves was nearly the same as that for the good and choice grade. While the seasonal pattern of prices of good and choice veal calves at Jersey City was similar to that for the markets in or near Kentucky, the price pattern at South St. Paul and Chicago differed somewhat, particularly from September through December.

2. Receipts of veal calves at Louisville and at the four central Kentucky auction markets increased from January to May, remained seasonally high from May through August, and then declined from August to December at about the same rate as the increase from January to May. Monthly receipts during the peak months, May through August, were about twice as large as those during November through February. Most nearly like the pattern of receipts of Kentucky veal calves were the patterns of receipts of calves at the combined terminal markets in the Eastern Dairy area, the Eastern Corn Belt area, and the Southcentral-Southeastern area. At such markets as South St. Paul, Milwaukee, and Chicago the patterns of receipts differed materially from those for Kentucky. In the areas where the marketings of slaughter and stocker-feeder calves were large, the seasonal patterns of receipts of calves showed a high peak during the fall months.

3. While the seasonal patterns of weights at the four central Kentucky auction markets were similar during 1926-29, 1930-37, and

1938-43, the level of the patterns increased from 1926-39 to 1938-43. Weights of calves were seasonally lowest during December through March, increased sharply from March to May, remained high from May through October and decreased from October to December. Calves marketed from May to October, during 1938-43, were, on the average, about 20 pounds per head heavier than those marketed in the winter months.

4. Part of the seasonal change in prices of veal calves at markets in or near Kentucky can be explained by changes in receipts at markets in the Eastern Dairy and Eastern Corn Belt areas, at Kentucky markets, and over the United States as a whole as indicated by the number of calves slaughtered under federal inspection. Only general interpretation of the relation of prices to receipts can be made, however, because of shortcomings of the data.

5. The margins between the value of a Kentucky veal calf when marketed and the value of butterfat in the milk used by it in growth, during 1932-42, were seasonally largest for calves marketed in January, February, September, and October and were lowest from April through July. The margins varied about $4.00 a head during the year.

3½M—6-46

VITA

Aubrey J. Brown was born at Hemple, Missouri on July 3, 1913. He attended the public schools at Cameron, Missouri, high school at Marion, Kansas, graduating from there in 1931. In 1935, he received the B.S. degree in Civil Engineering from the University of Illinois and in 1937, the M.S. degree in Agricultural Economics from the same institution. From September 1935 to September 1938 he served as an Assistant in the Department of Agricultural Economics at the University of Illinois doing part-time research and teaching.

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